TRANSFORMATIONS

SPECS 2001

1. If the graph of $y = f(x)$ is translated 5 units to the left, determine the resulting equation.

   A. $y - 5 = f(x)$ B. $y + 5 = f(x)$ C. $y = f(x - 5)$ D. $y = f(x + 5)$

2. How is the graph $5y = \sqrt{x}$ related to the graph $y = \sqrt{x}$?

   A. $y = \sqrt{x}$ has been vertically translated 5 units up.

   B. $y = \sqrt{x}$ has been expanded vertically by a factor of 5.

   C. $y = \sqrt{x}$ has been compressed vertically by a factor of $\frac{1}{5}$

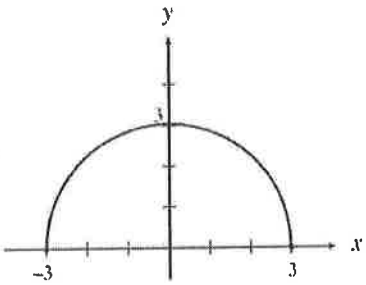
   D. $y = \sqrt{x}$ has been compressed horizontally by a factor of $\frac{1}{5}$

3. Simplify: $f^{-1}(f(x))$

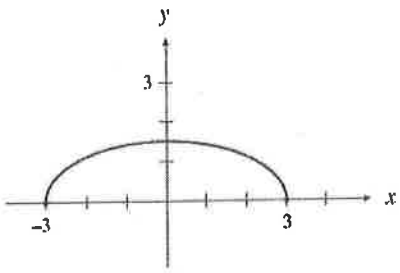
   A. x B. $-x$ C. $\frac{1}{x}$ D. $-\frac{1}{x}$

4. The graph of $y = \sqrt{9 - x^2}$ is shown.

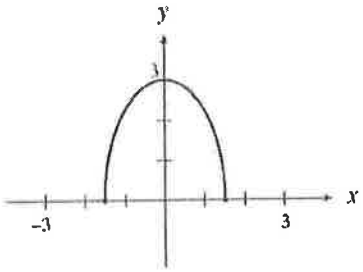
   Which of the following graphs represents $2y = \sqrt{9 - x^2}$?



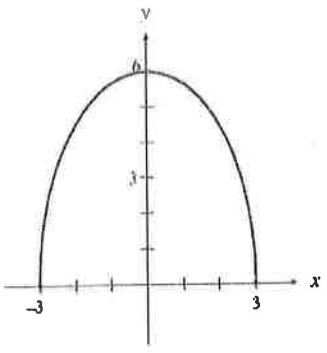
A.



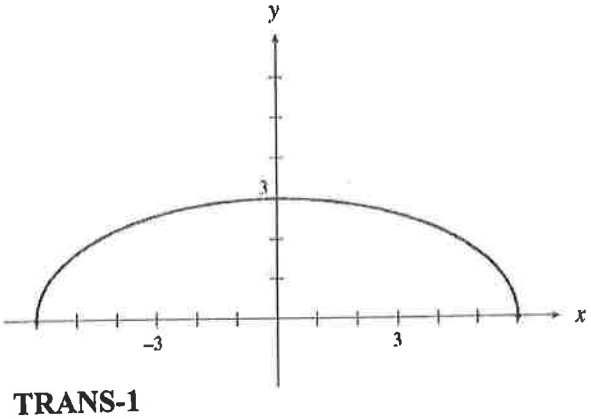
B.



C.



D.



5. Given the function $f(x) = (x-1)^3 + 2$, determine $f^{-1}(x)$, the inverse function.

A. $f^{-1}(x) = \sqrt[3]{x+2} + 1$

B. $f^{-1}(x) = \sqrt[3]{x-2} + 1$

C. $f^{-1}(x) = \sqrt[3]{x+2} - 1$

D. $f^{-1}(x) = \sqrt[3]{x-2} - 1$

6. The function $y = f(x)$ is transformed to $y = f(2x + 4)$. Identify the horizontal expansion or compression factor, then the translation to the graph of the function.

A. horizontal expansion by a factor of 2, then a translation of 4 units left.

B. horizontal compression by a factor of $\frac{1}{2}$, then a translation of 4 units left.

C. horizontal expansion by a factor of 2, then a translation of 2 units left.

D. horizontal compression by a factor of $\frac{1}{2}$, then a translation of 2 units left.

SAMPLE 2001

If the zeros of the function $y = f(x)$ are -2 and 3, determine the equations of the vertical asymptotes of the function $y = \frac{1}{f(x)}$.

A. $x = -2,\ x = 3$

B. $x = 2,\ x = -3$

C. $y = -2,\ y = 3$

D. $y = 2,\ y = -3$

8. If $(6, -5)$ is a point on the graph of $y = f(x)$, what must be a point on the graph of $y = -f(2(x + 2)) - 3$?

A. $(-1, 2)$

B. $(1, -2)$

C. $(1, 2)$

D. $(10, 2)$

9. Given the function $y_1 = f(x)$, describe how the graph of the new function, $y_2 = 4f(x-2)$, is related to the graph of y_1.

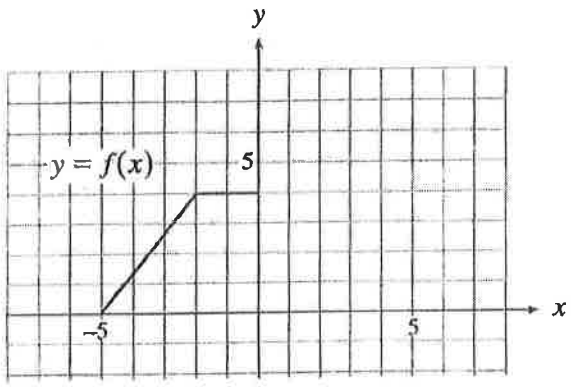
A. The graph of y_1 has been vertically compressed by a factor of $\frac{1}{4}$ then translated 2 units right to form the graph of y_2.

B. The graph of y_1 has been vertically expanded by a factor of 4 then translated 2 units right to form the graph of y_2.

C. The graph of y_1 has been vertically compressed by a factor of $\frac{1}{4}$ then translated 2 units left to form the graph of y_2.

D. The graph of y_1 has been vertically expanded by a factor of 4 then translated 2 units left to form the graph of y_2.

10. Given the graph of the function $y = f(x)$ below, sketch the graph of each relation on the grids provided.



a) $y = f(-x)$

b) $y = f(x-3)$

c) $y = 2f(x)$

d) $x = f(y)$

JAN 2002

11. Which equation represents the graph of $y = \sqrt{x}$ after it is translated 4 units to the right?

A. $y = \sqrt{x} - 4$
B. $y = \sqrt{x-4}$
C. $y = \sqrt{x+4}$
D. $y = \sqrt{x} + 4$

12. If $f(x) = 5x - 1$, determine the equation of $f^{-1}(x)$, the inverse of $f(x)$.

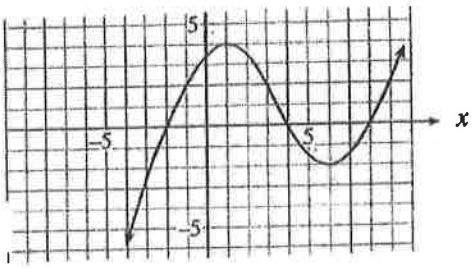
A. $f^{-1}(x) = \frac{1}{5x-1}$

B. $f^{-1}(x) = \frac{1}{5}x - 1$

C. $f^{-1}(x) = \frac{x+1}{5}$

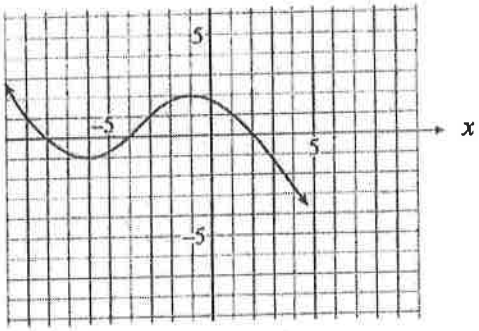
D. $f^{-1}(x) = \frac{x-1}{5}$

13. The graph of $y = f(x)$ is shown

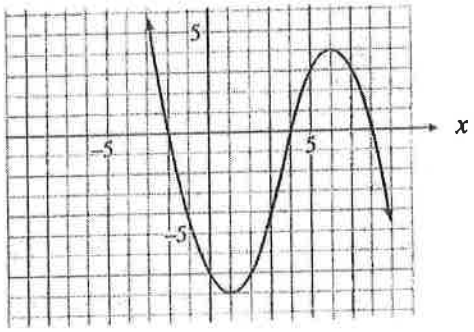


Which of the following graphs represents $y = -2f(x)$?

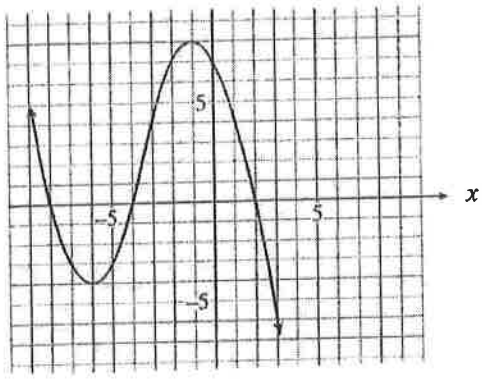
A.



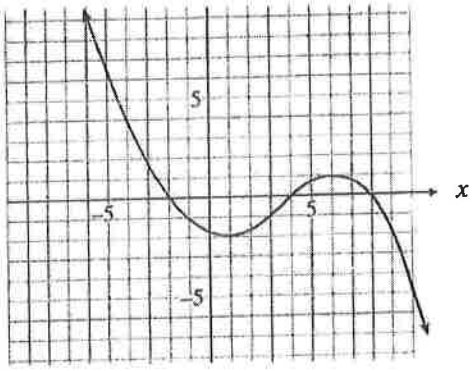
B.



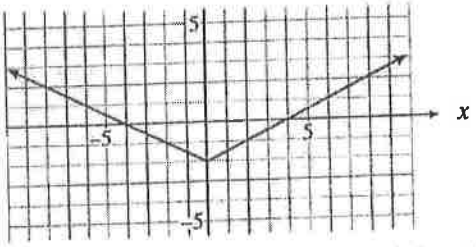
C.



D.

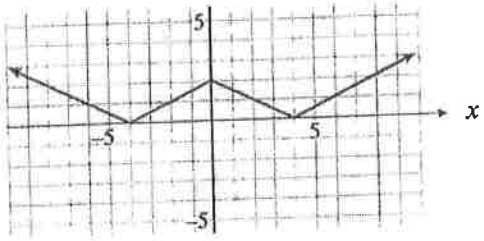


14. The graph of $y = f(x)$ is shown

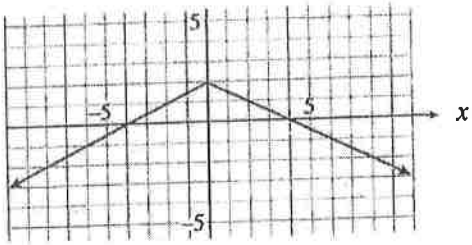


Which of the following graphs represents $y = \frac{1}{f(x)}$?

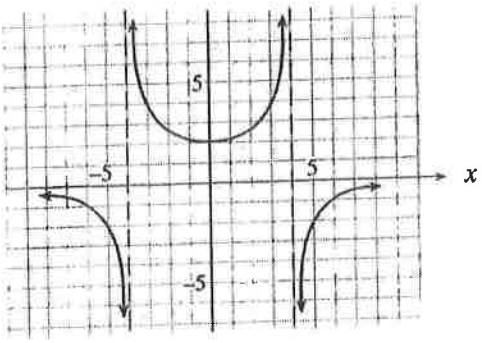
A.



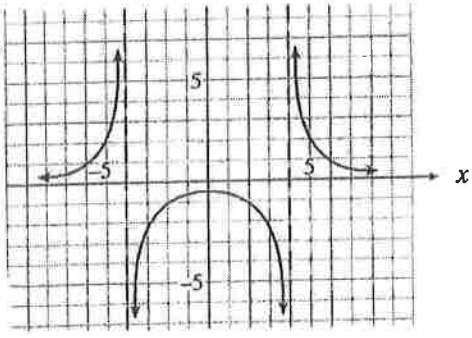
B.



C.



D.



15. Which equation represents the graph of $y = x^3 + x^2$ after it is reflected in the y-axis?

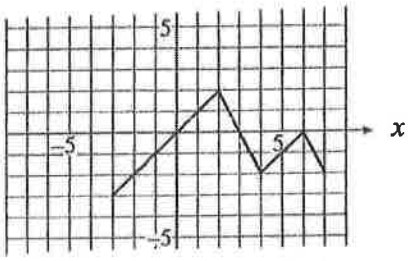
A. $y = -x^3 + x^2$

B. $y = -x^3 - x^2$

C. $y = \dfrac{1}{x^3 + x^2}$

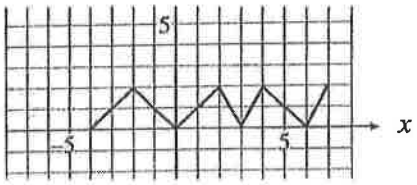
D. $x = y^3 + y^2$

16. The graph of Math Mountain, $y = m(x)$ is shown

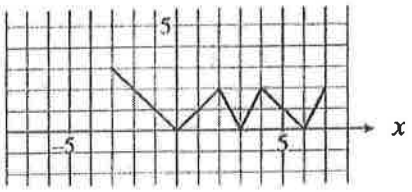


Which of the following graphs represents $y = m(|x|)$?

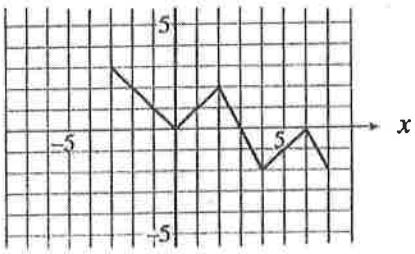
A.



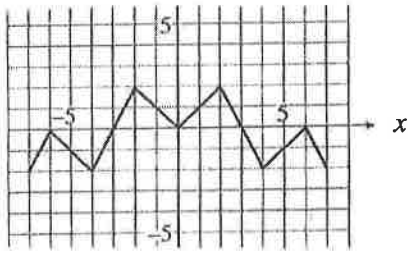
B.



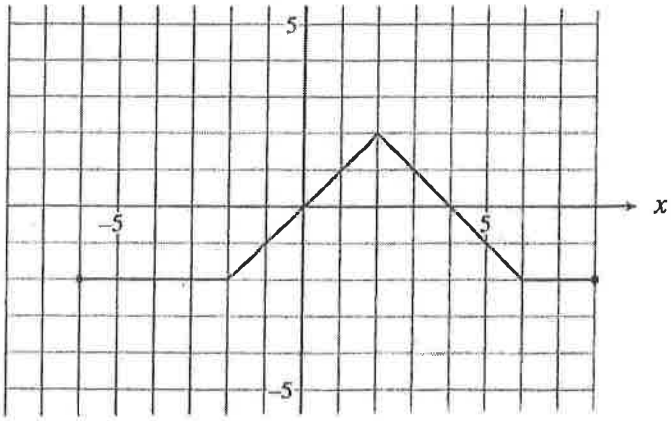
C.



D.



17. The graph of $y = f(x)$ is shown



On the grids provided, sketch the graphs of:

a) $y = f(x+2) - 3$

b) $y = f(2x)$

c) $y = |f(2x)|$

APR 2002

18. Given the function $y = f(x)$, which of the following represents its reflection in the y-axis?

A. $y = f(-x)$

B. $y = -f(x)$

C. $x = f(y)$

D. $y = \frac{1}{f(x)}$

19. How is the graph of $y = \frac{1}{7} f(x)$ related to the graph of $y = f(x)$?

A. $y = f(x)$ has been compressed vertically by a factor of $\frac{1}{7}$.

B. $y = f(x)$ has been compressed horizontally by a factor of $\frac{1}{7}$.

C. $y = f(x)$ has been expanded vertically by a factor of 7.

D. $y = f(x)$ has been expanded horizontally by a factor of 7.

20. Given $f(x) = x^3 - 27$, determine $f^{-1}(x)$, the inverse of $f(x)$.

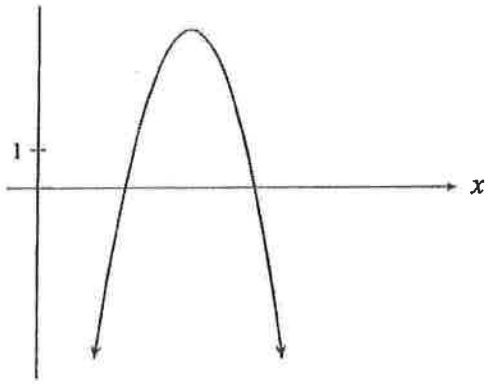
A. $f^{-1}(x) = \sqrt[3]{x+27}$

B. $f^{-1}(x) = \sqrt[3]{x-27}$

C. $f^{-1}(x) = \sqrt[3]{x} + 3$

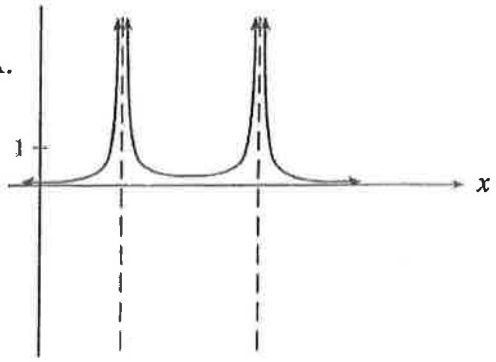
D. $f^{-1}(x) = x^3 + 27$

21. The graph of the function $y = f(x)$ is shown below.

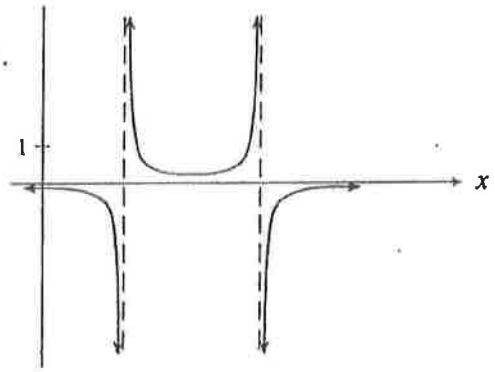


Which of the following is a graph of $y = \frac{1}{|f(x)|}$?

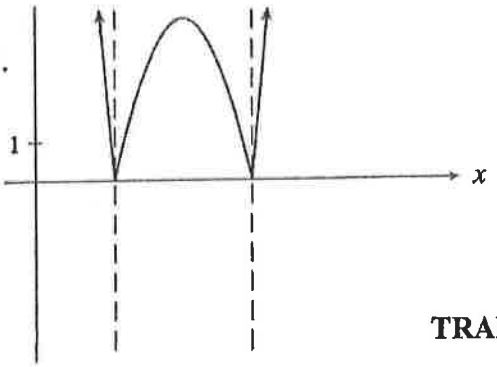
A.



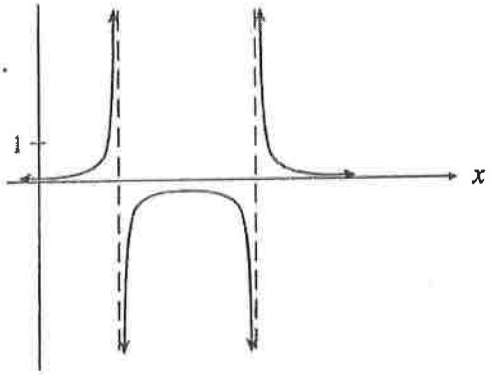
B.



C.



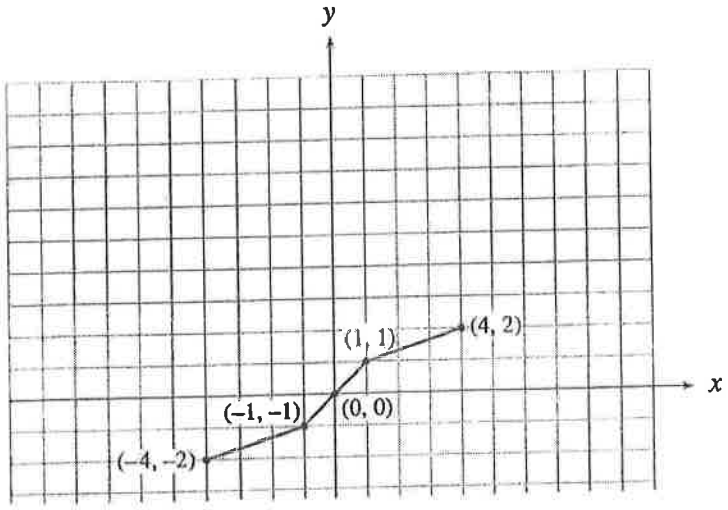
D.



22. If $(4, -3)$ is a point on the graph of $y = f(x)$, what must be a point on the graph of $y = f(2x+10)$?

A. $(-8, -3)$
B. $(-3, -3)$
C. $(3, -3)$
D. $(18, -3)$

23. The graph of the function $y = f(x)$ is shown below.

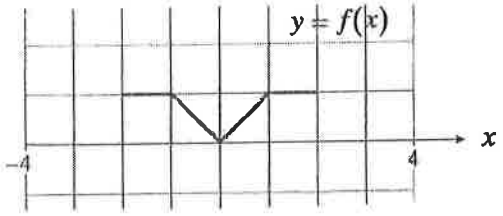


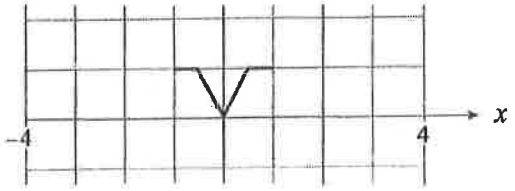
a) On the grid provided, sketch the graph of $y = 3f(x-2)$.

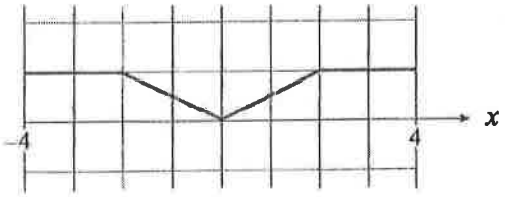
b) On the grid provided, sketch the graph of $y = -f\left(\frac{x}{2}\right)$.

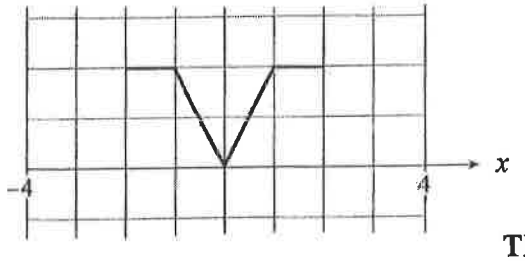
JUN 2002

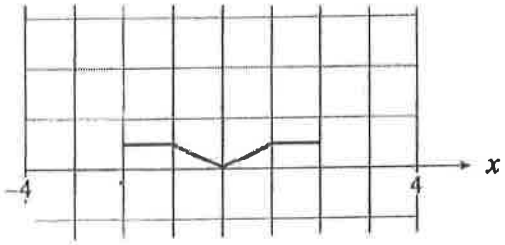
24. Given the graph of $y = f(x)$,
select the graph of $y = \frac{1}{2}f(x)$.



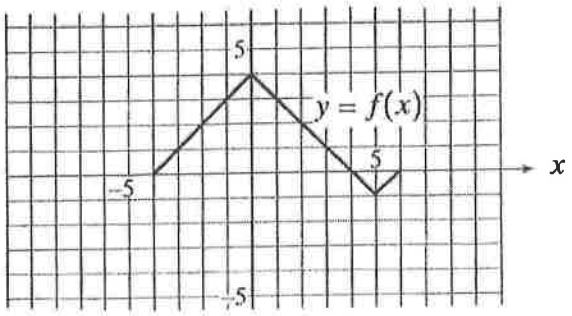
A.


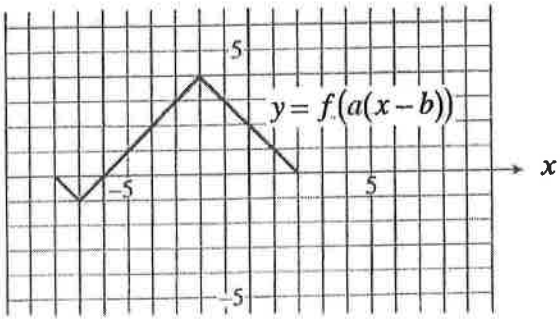
B.


C.


D.


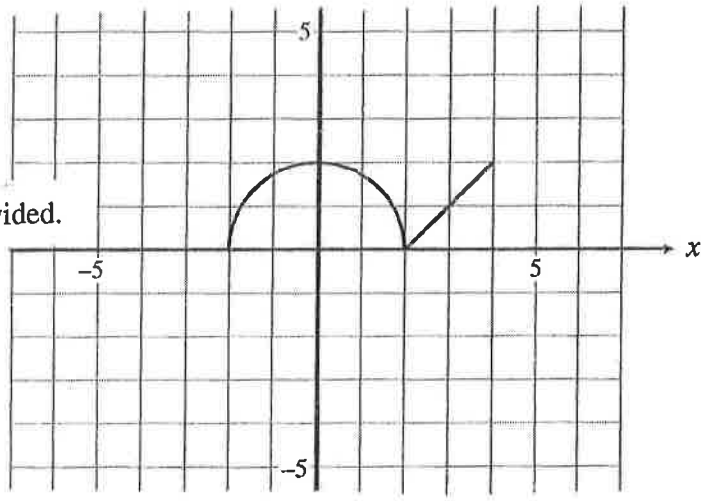
25. Two functions are graphed below, $y = f(x)$ and $y = f(a(x-b))$. Determine the values of a and b.





A. $a = -1,\ b = -2$
B. $a = -1,\ b = 2$
C. $a = 1,\ b = -2$
D. $a = 1,\ b = 2$

26. The graph of $y = f(x)$ is shown



a) Graph $y = 2f(x+3) - 1$ on the grid provided.

b) Graph the inverse relation of $y = f(x)$.

AUG 2002

27. How is the graph of $y = \sqrt{x-3} + 1$ related to the graph of $y = \sqrt{x}$?

A. $y = \sqrt{x}$ has been translated 3 units right and 1 unit up.
B. $y = \sqrt{x}$ has been translated 3 units right and 1 unit down.
C. $y = \sqrt{x}$ has been translated 3 units left and 1 unit up.
D. $y = \sqrt{x}$ has been translated 3 units left and 1 unit down.

28. Given $f(x) = 3x + 2$, determine $f^{-1}(x)$, the inverse of $f(x)$.

A. $f^{-1}(x) = \frac{x}{3} - 2$

B. $f^{-1}(x) = \frac{x-2}{3}$

C. $f^{-1}(x) = \frac{1}{3x+2}$

D. $f^{-1}(x) = 2 - \frac{x}{3}$

29. Which equation represents a reflection of the graph of $5 - x = 2y^2 + y$ in the y-axis?

A. $5 + x = 2y^2 + y$

B. $5 - x = 2y^2 - y$

C. $5 + y = 2x^2 + x$

D. $-5 - x = 2y^2 + y$

30. If the point $(-3, -6)$ is on the graph of $y = f(x)$, determine a point on the graph of $y = 3|f(x)| + 1$.

A. $(3, 3)$

B. $(3, 19)$

C. $(-3, 3)$

D. $(-3, 19)$

31. Which equation represents the graph of $y = f(x)$ after it is compressed horizontally by a factor of $\frac{1}{2}$ and then translated 4 units right?

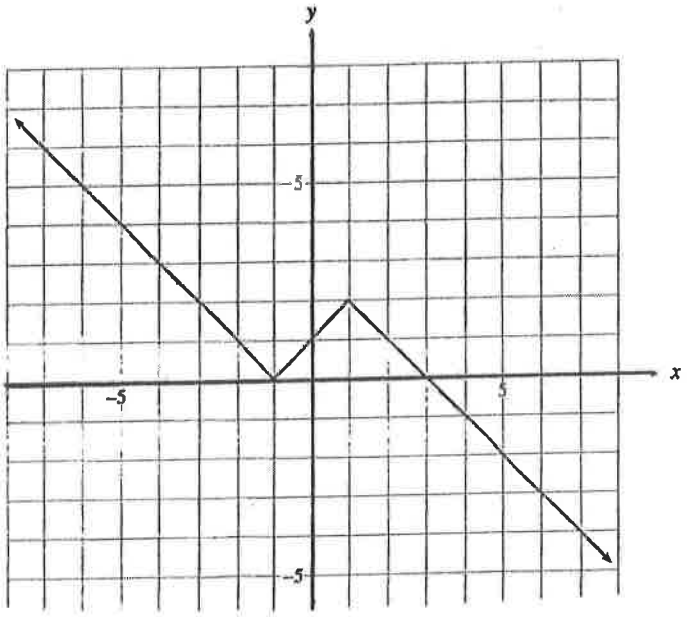
A. $y = f(2x - 8)$

B. $y = f(2x - 4)$

C. $y = f\left(\frac{x-4}{2}\right)$

D. $y = f\left(\frac{x}{2} - 4\right)$

32. The graph of $y = f(x)$ is shown below. Sketch the graph of $y = \frac{1}{f(x)}$ directly on the same grid. Accurate location of key points is necessary for full marks.



JAN 2003

33. How is the graph of $y = f(x)+3$ related to the graph of $y = f(x)$?

A. $y = f(x)$ has been translated 3 units up.
B. $y = f(x)$ has been translated 3 units down.
C. $y = f(x)$ has been translated 3 units to the left.
D. $y = f(x)$ has been translated 3 units to the right.

34. Which equation represents the graph of $y = f(x)$ after it is reflected in the line $y = x$?

A. $x = f(y)$

B. $y = f(-x)$

C. $y = -f(x)$

D. $y = \dfrac{1}{f(x)}$

35. If the graph of the function $y = \sqrt{x}$ is horizontally expanded by a factor of 3 and then translated 2 units to the right, determine the equation of this new function.

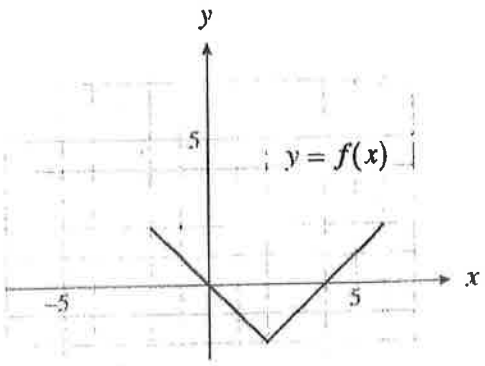
A. $y = \sqrt{3(x-2)}$

B. $y = \sqrt{\frac{1}{3}(x-2)}$

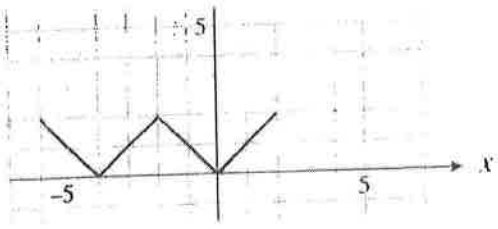
C. $y = \sqrt{3x-2}$

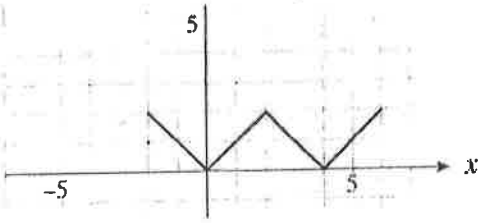
D. $y = \sqrt{\frac{1}{3}x-2}$

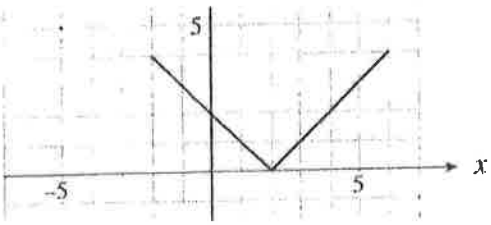
36. The graph of the function $y = f(x)$ is shown

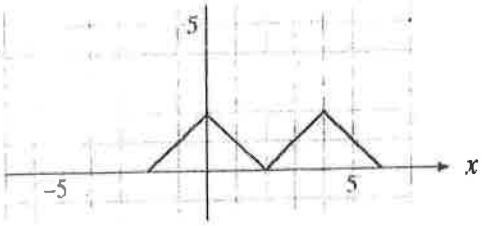


Which of the following is the graph of $y = |f(x)|$?

A.


B.


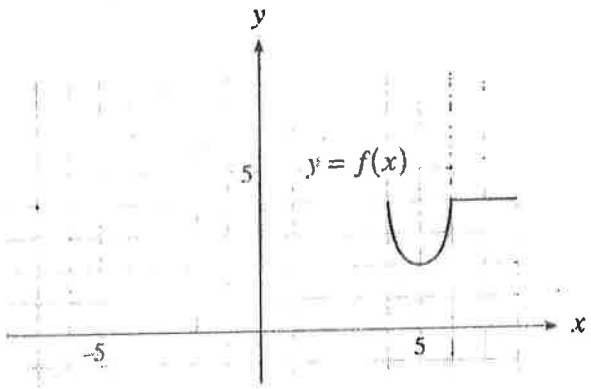
C.


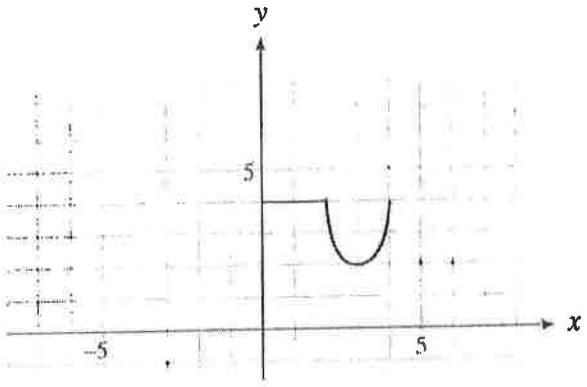
D.


37. If $(8, -6)$ is a point on the graph of $y = f(x)$, what must be a point on the graph of $y = -f(2x) + 3$?

A. $(-16, -3)$
B. $(-4, -3)$
C. $(4, 9)$
D. $(16, 9)$

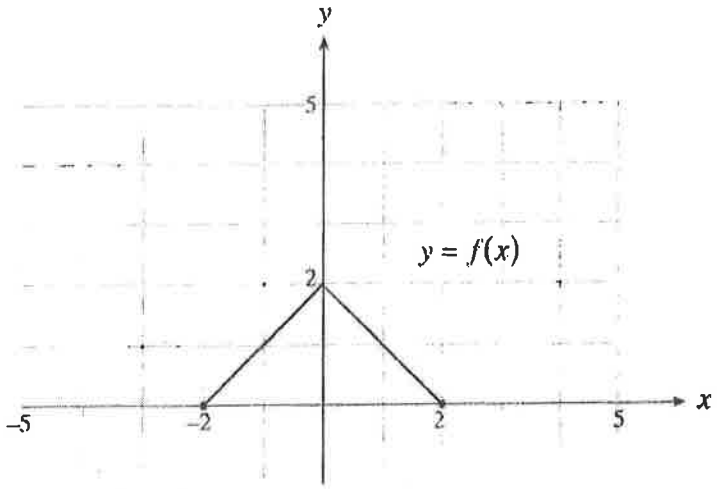
38. The graph of $y = f(x)$ is shown below on the left. Which equation represents the graph shown on the right?





A. $y = f(-(x+8))$
B. $y = f(-(x-8))$
C. $y = -f(x-8)$
D. $y = -f(x+8)$

39. The graph of $y = f(x)$ is shown

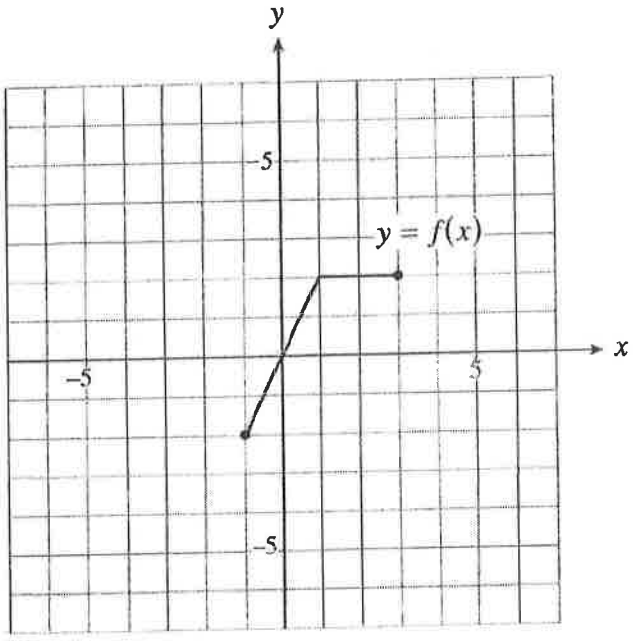


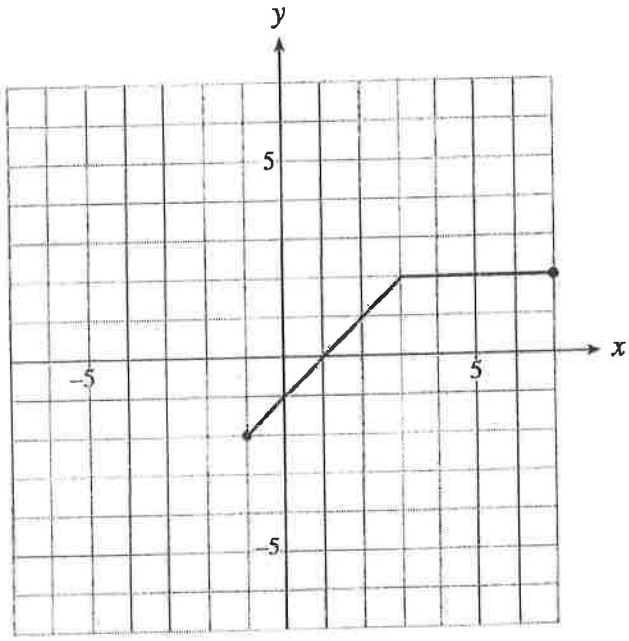
a) On the grid provided, sketch the graph of $y = 2f(x+3)$.

b) On the grid provided, sketch the graph of $y = \frac{1}{f(x)}$.

JUN 2003

40. The function $y = f(x)$ is graphed to the left below. Determine the equation of the function shown to the right.





A. $y = f(2(x-1))$

B. $y = f\left(\frac{1}{2}(x-1)\right)$

C. $y = 2f(x-1)$

D. $y = \frac{1}{2}f(x-1)$

41. If the point (a, b) is on the graph of $y = f(x)$, which point must be on the graph of $y = \frac{1}{f(x-2)}$? $(a \neq 0, b \neq 0)$

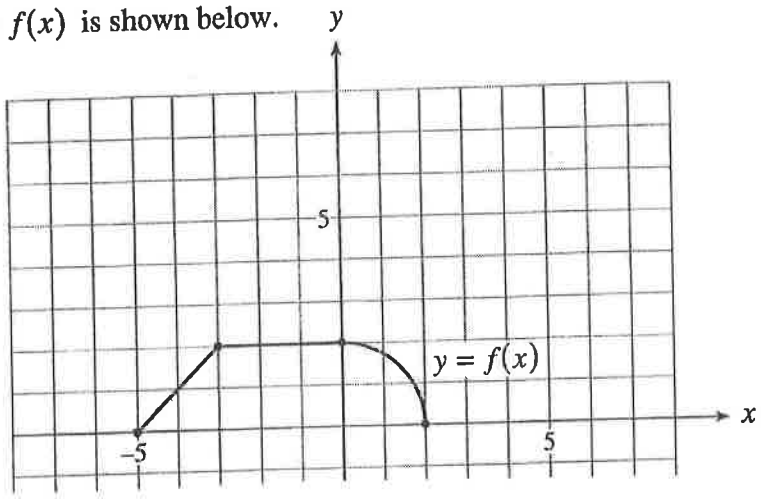
A. $\left(a-2, \frac{1}{b}\right)$

B. $\left(a+2, \frac{1}{b}\right)$

C. $\left(\frac{1}{a}, b\right)$

D. $(a+2, b)$

42. The graph of $y = f(x)$ is shown below.



a) On the grid provided, sketch the graph of $y = 2f(x) - 3$.

b) On the grid provided, sketch the inverse relation of $y = f(x)$.

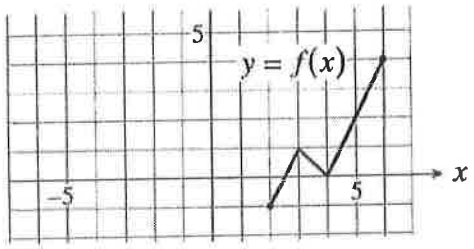
JAN 2004

43. Which equation represents the graph of $y = g(x)$ after it is translated 5 units up?

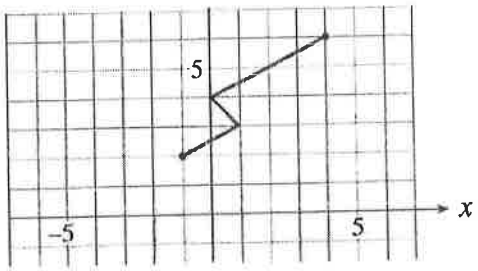
A. $y = g(x) + 5$
B. $y = g(x) - 5$
C. $y = g(x + 5)$
D. $y = g(x - 5)$

44. The graph of $y = f(x)$ is shown

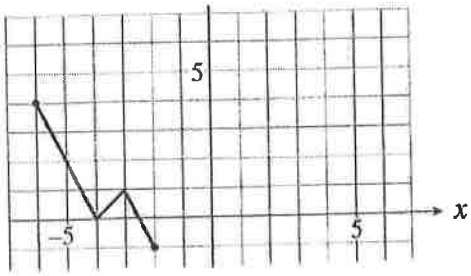
Which graph represents $x = f(y)$?



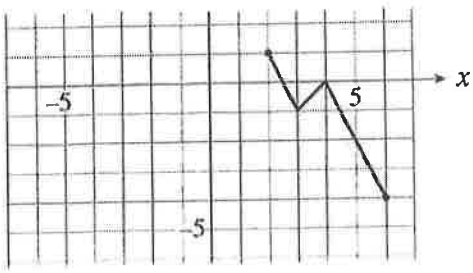
A.



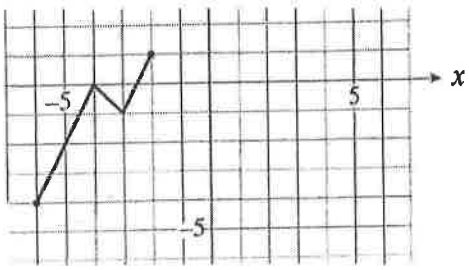
B.



C.



D.



45. If the point $(4, 6)$ is on the graph of $y = f(x)$, what point must be on the graph of $y = 3\left(\frac{1}{f(x)}\right)$?

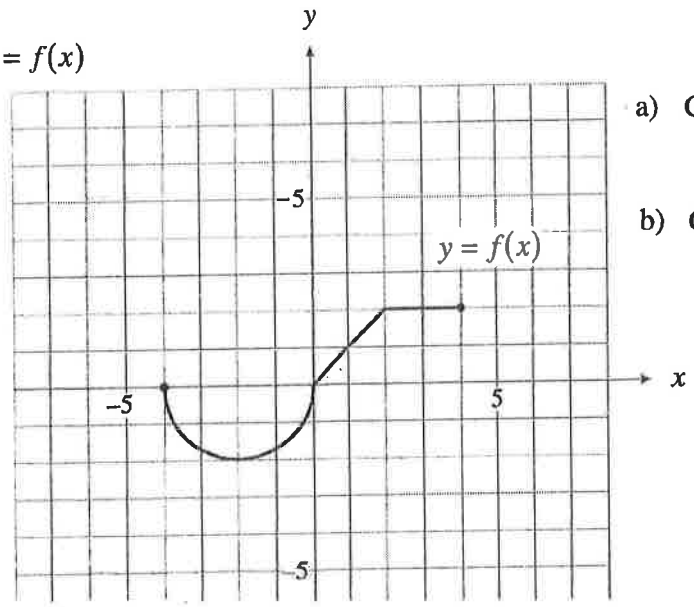
A. $\left(12, \frac{1}{6}\right)$

B. $\left(4, \frac{1}{18}\right)$

C. $\left(4, \frac{1}{2}\right)$

D. $(2, 18)$

46. The graph of $y = f(x)$ is shown below.



a) Graph: $y = -2f(x+3)$

b) Graph: $y = \left|f\left(\frac{x}{2}\right)\right|$

JUN 2004

47. Which equation represents the graph of $y = \tan x$ after it has been translated 4 units up and 7 units left?

A. $y = \tan(x+7)+4$

B. $y = \tan(x+7)-4$

C. $y = \tan(x-7)+4$

D. $y = \tan(x-7)-4$

48. The point $(9, -12)$ is on the graph of a function. What will the coordinates of this point be after all of the following transformations are performed on the function, in the order given?

- horizontal expansion by a factor of 3
- reflection in the x-axis
- vertical translation of 5 downward
- reflection in the line $y = x$

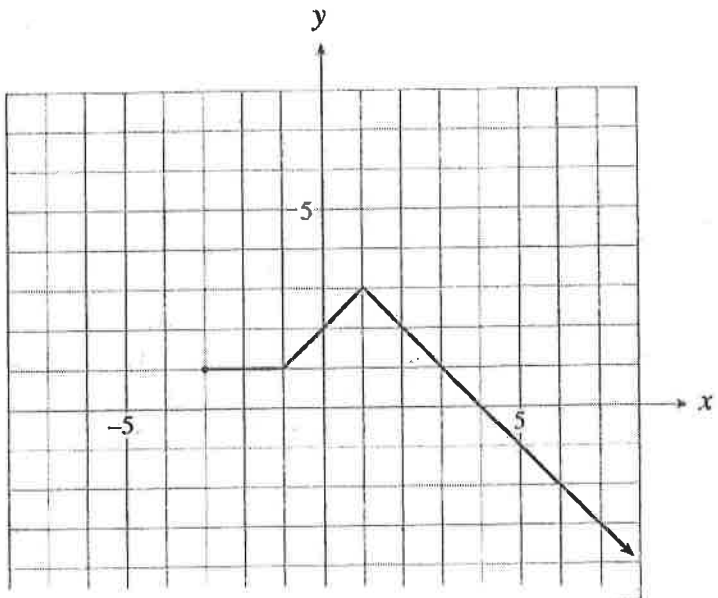
A. $(-27, 7)$

B. $(-17, -27)$

C. $(7, 3)$

D. $(7, 27)$

49. The graph of $y = f(x)$ is shown below.



a) On the grid provided, sketch the graph of $y = f(-x) - 3$.

b) On the grid provided, sketch the graph of $y = \frac{1}{f(x)}$.

AUG 2005

50. If the function $y = 3^x$ is expanded vertically by a factor of 9 to produce a new function, which of the following is an equation of the new function?

A. $y = 3^{2x}$

B. $y = 3^{3x}$

C. $y = 3^{x+2}$

D. $y = 3^{x-2}$

51. Which equation represents the graph of $y = g(x)$ after it is translated 3 units to the right?

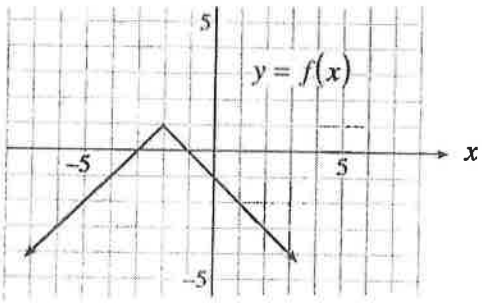
A. $y = g(x) + 3$

B. $y = g(x) - 3$

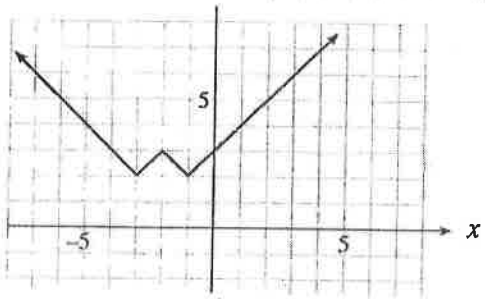
C. $y = g(x + 3)$

D. $y = g(x - 3)$

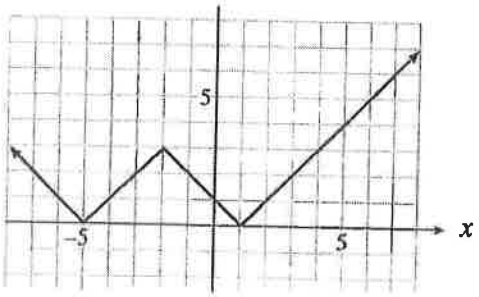
52. The graph of $y = f(x)$ is shown below. Which graph represents $y = |f(x)| + 2$?



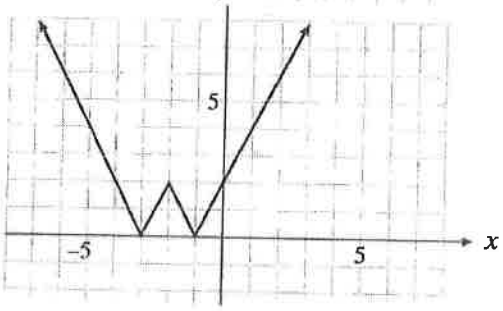
A.



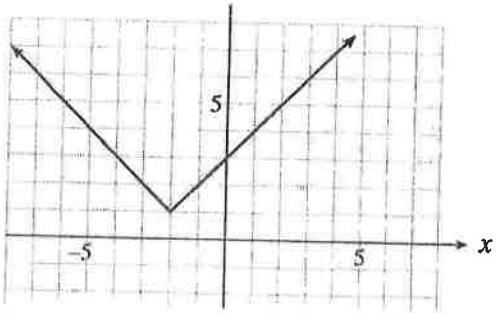
B.



C.

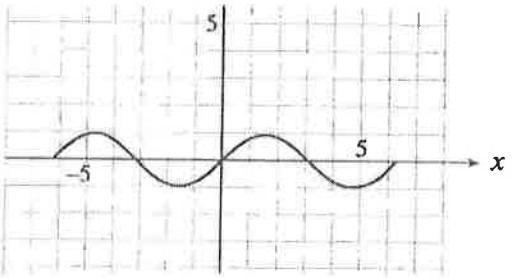


D.

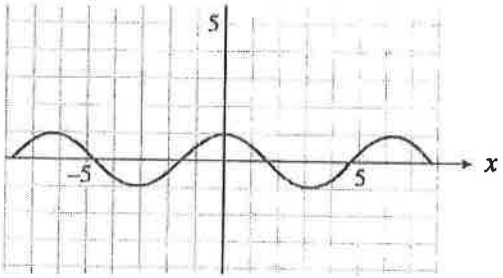


53. For which of the following functions is $f(-x) = f(x)$?

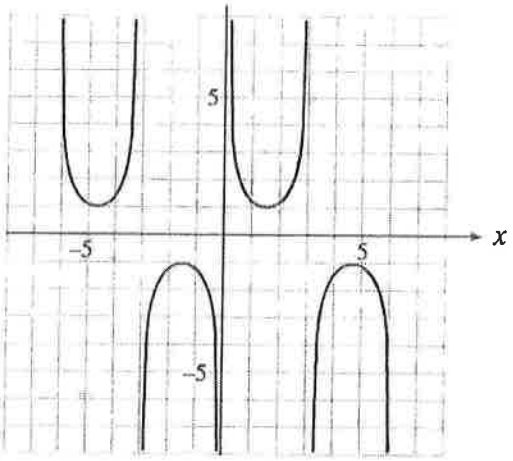
A.



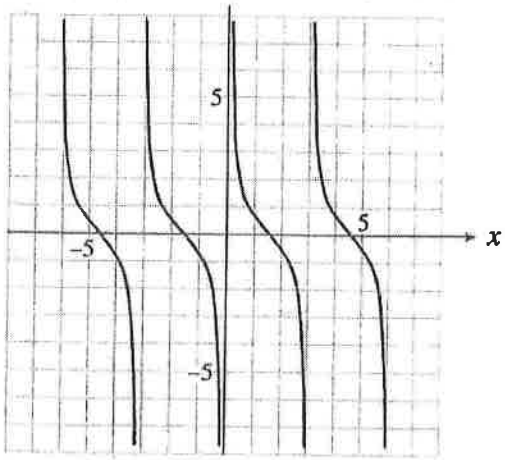
B.



C.



D.



54. If the point $(6, 10)$ is on the graph of $y = f(x)$, which point must be on the graph of $y = \frac{1}{2f(x)}$?

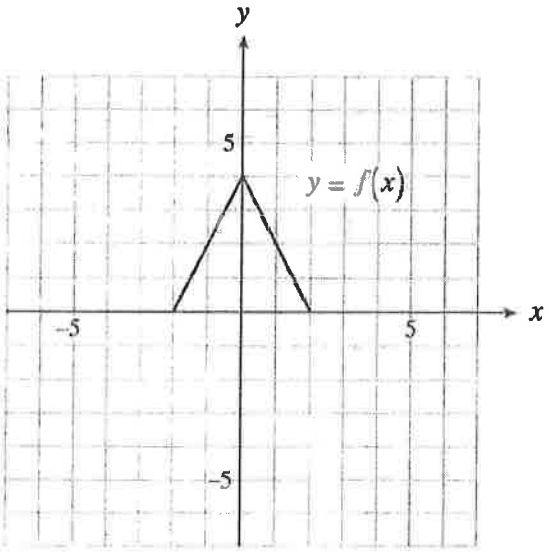
A. $\left(3, \frac{1}{10}\right)$

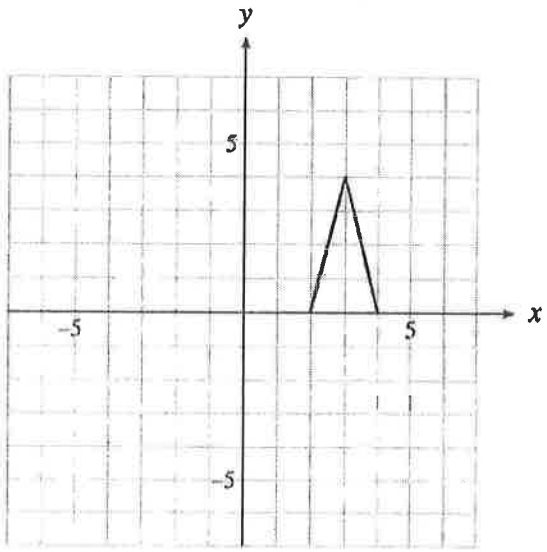
B. $\left(6, \frac{1}{5}\right)$

C. $\left(6, \frac{1}{10}\right)$

D. $\left(6, \frac{1}{20}\right)$

55. Given the graph of the function $y = f(x)$ on the left, determine the equation of the function on the right.





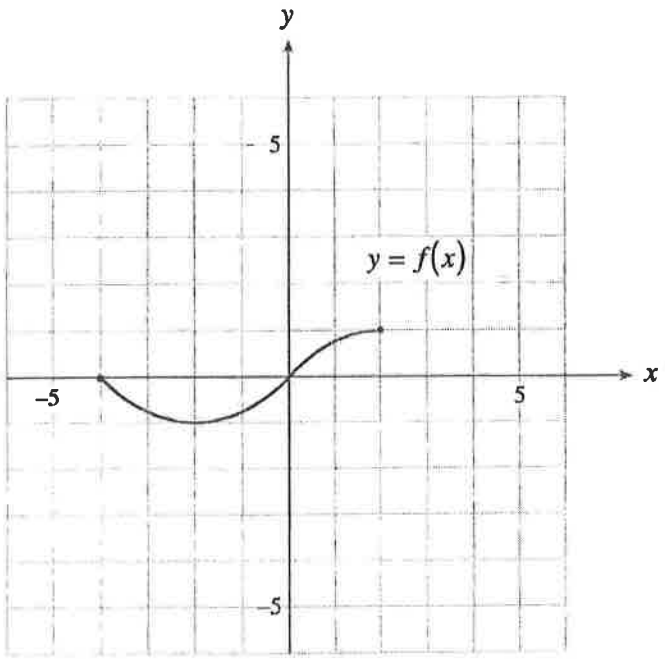
A. $y = f\left(\frac{x}{2} - 3\right)$

B. $y = f\left(\frac{x-3}{2}\right)$

C. $y = f(2x - 3)$

D. $y = f(2x - 6)$

The graph of $y = f(x)$ is shown below.



56. On the grid provided, sketch the graph of $y = 3f(x) + 1$.

57. On the grid provided, sketch the graph of $y = \frac{1}{f(x)}$.

AUG 2006

58. Which equation represents the graph of $\frac{(x-2)^2}{4} + \frac{(y-3)^2}{9} = 1$ after it is translated 5 units to the right and 1 unit up?

A. $\frac{(x-7)^2}{4} + \frac{(y-4)^2}{9} = 1$

B. $\frac{(x-7)^2}{4} + \frac{(y-2)^2}{9} = 1$

C. $\frac{(x+3)^2}{4} + \frac{(y-4)^2}{9} = 1$

D. $\frac{(x+3)^2}{4} + \frac{(y-2)^2}{9} = 1$

59. Which equation represents the graph of $y = 2^x$ after it is reflected in the x-axis?

A. $y = 2^{-x}$

B. $y = -2^x$

C. $y = \log_2 x$

D. $y = -\log_2 x$

60. How is the graph of $y = f(4x)$ related to the graph of $y = f(x)$?

A. $y = f(x)$ has been compressed vertically by a factor of $\frac{1}{4}$.

B. $y = f(x)$ has been compressed horizontally by a factor of $\frac{1}{4}$.

C. $y = f(x)$ has been expanded vertically by a factor of 4.

D. $y = f(x)$ has been expanded horizontally by a factor of 4.

61. If the maximum value of the function $y = f(x)$ is 6, determine the maximum value of $y = \frac{1}{3} f\left(\frac{1}{2}x\right)$.

A. 2

B. 3

C. 12

D. 18

62. If the point $(-2, -5)$ is on the graph of $y = f(x)$, which point must be on the graph of $y = |f(x-1)| - 3$?

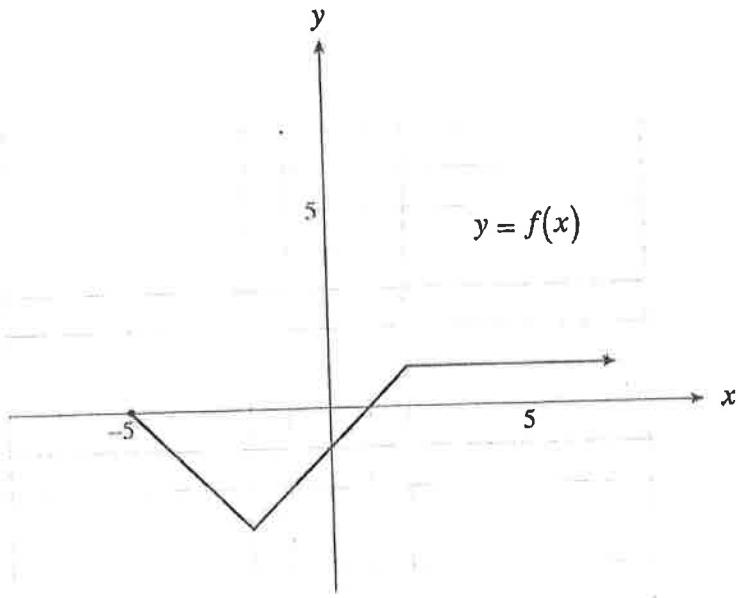
A. $(-3, 2)$

B. $(-1, 2)$

C. $(1, -8)$

D. $(3, -8)$

The graph of $y = f(x)$ is shown below.



63. On the grid provided, sketch the graph of $y = 2|f(x)| + 1$.

64. On the grid provided, sketch the graph of $y = \frac{1}{f(x)}$.

SAMPLE 2008

65. Which equation represents the graph of $y = f(x)$ after it is vertically compressed by a factor of $\frac{1}{2}$ and then translated 2 units to the left?

A. $\frac{y}{2} = f(x+2)$

B. $\frac{y}{2} = f(x-2)$

C. $2y = f(x+2)$

D. $2y = f(x-2)$

66. Determine the inverse of the function $f(x)=\frac{4x+1}{3x}$.

A. $f^{-1}(x)=\frac{1}{3x-4}$

B. $f^{-1}(x)=\frac{-1}{3x-4}$

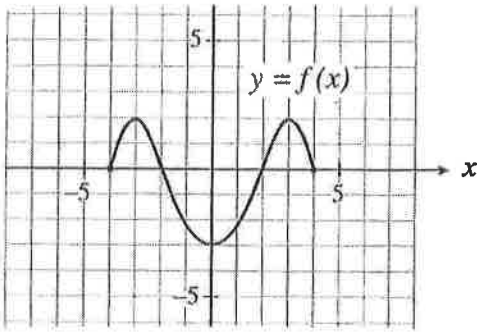
C. $f^{-1}(x)=\frac{3x}{4x+1}$

D. $f^{-1}(x)=\frac{-3x}{4x+1}$

67. The y-intercept of the function $y=f(x)$ is 5. Determine the y-intercept of $y=-f(x)+3$.

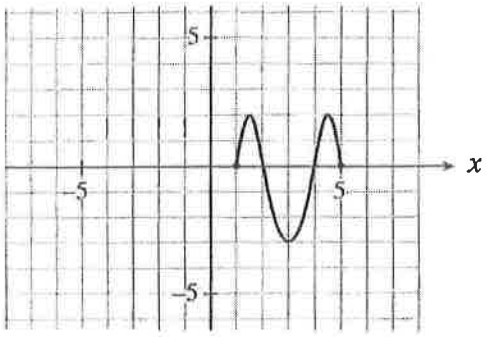
A. –2
B. –8
C. 8
D. 2

68. The graph of the function $y=f(x)$ is shown

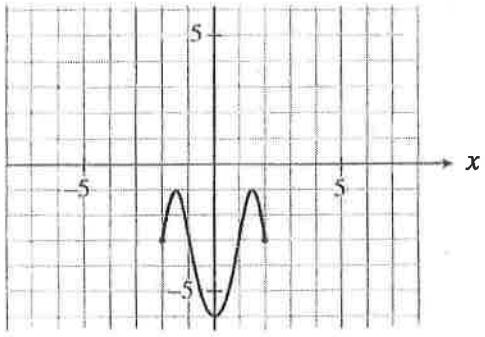


Which of the following is the graph of $y=f(2x)-3$?

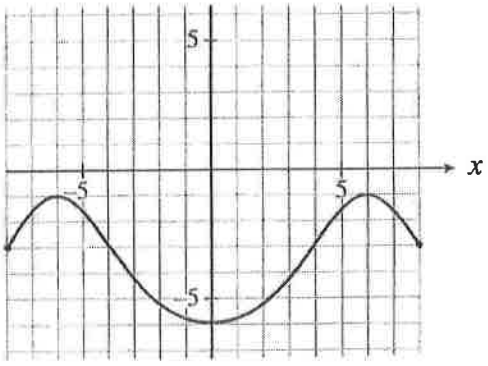
A.



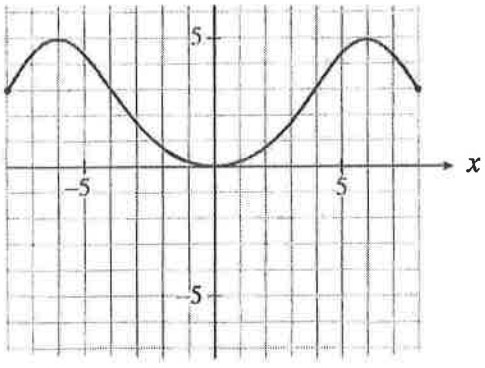
B.



C.



D.



69. If the point $(10, 6)$ is on the graph of $y = f(x)$, what point must be on the graph of $y = f(-2x-4)$?

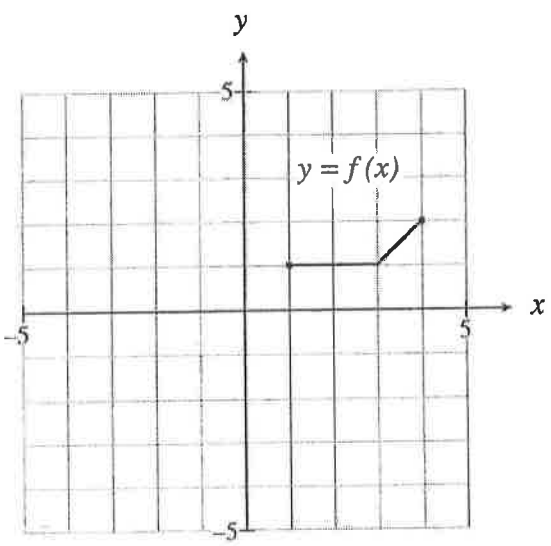
A. $(-7, 6)$

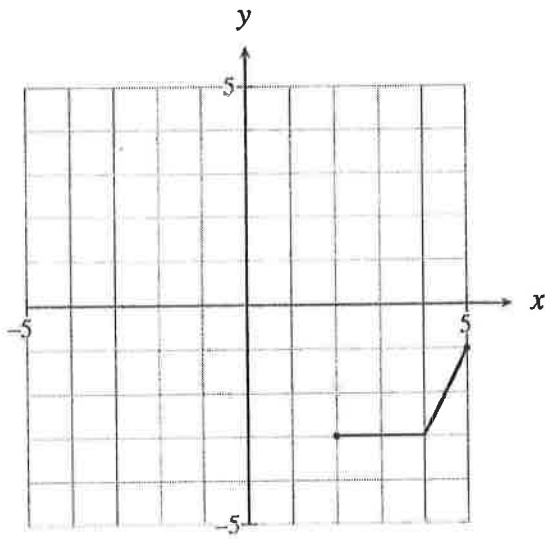
B. $(-9, 6)$

C. $(-22, 6)$

D. $(-24, 6)$

70. The graph of $y = f(x)$ is shown on the left. Determine an equation of the function graphed on the right.





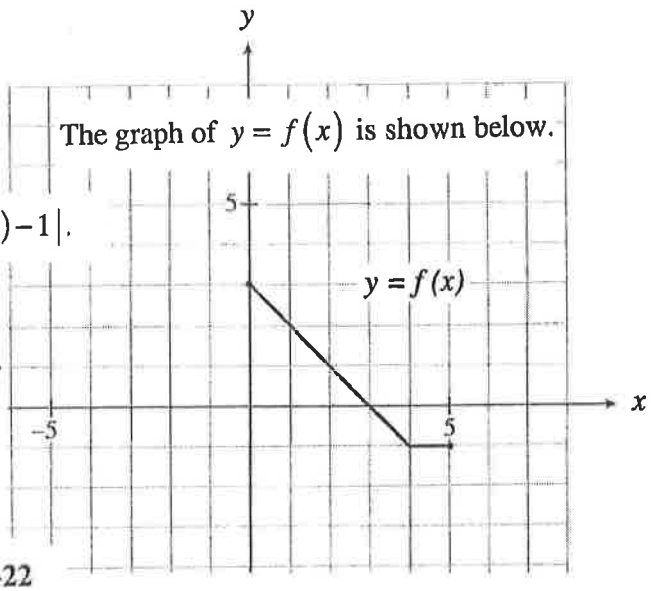
A. $y = \frac{1}{2}f(x-1)-5$

B. $y = \frac{1}{2}f(x-1)-4$

C. $y = 2f(x-1)-5$

D. $y = 2f(x-1)-4$

The graph of $y = f(x)$ is shown below.



71. On the grid provided, sketch the graph of $y = 2|f(x)-1|$.

72. On the grid provided, sketch the graph of $y = \frac{1}{f(x)}$.

73. If $f(x)=(x+4)(x-2)$, determine the zeros of the function $y=f(2x)$.

A. $-8, 4$
B. $-4, 2$
C. $-2, 1$
D. $-1, 2$

74. Which equation represents the graph of $y=f(x)$ after it is expanded vertically by a factor of 5?

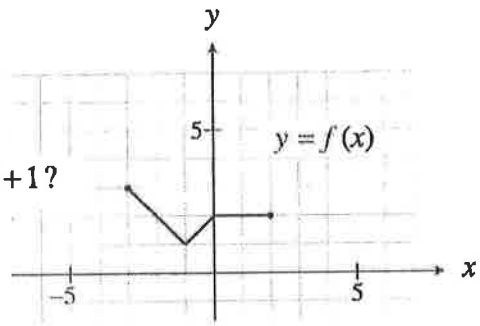
A. $y=\frac{1}{5}f(x)$

B. $y=5f(x)$

C. $y=f\left(\frac{x}{5}\right)$

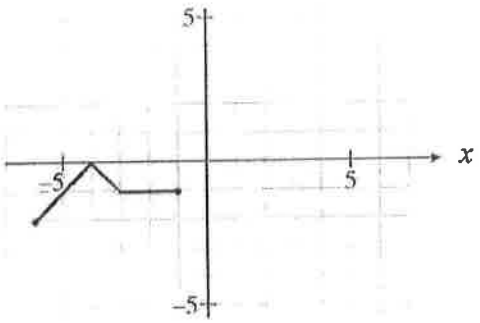
D. $y=f(5x)$

75. The graph of $y=f(x)$ is shown

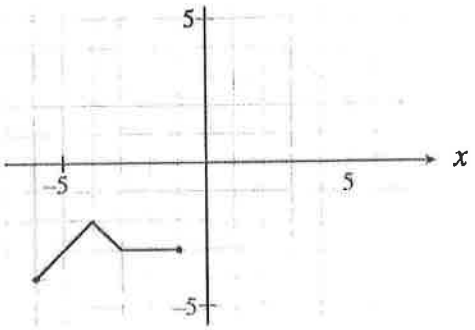


Which graph represents the graph of $y=-f(x+3)+1$?

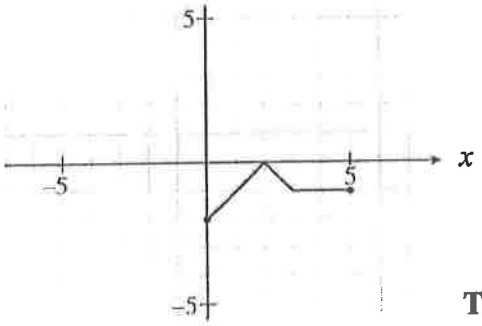
A.



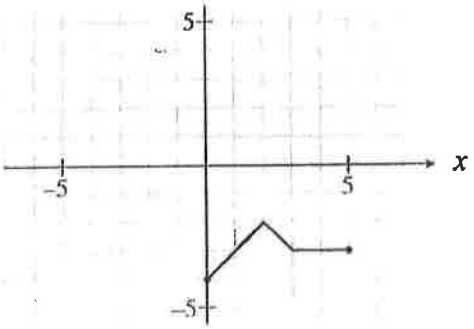
B.



C.



D.



76. Determine the inverse of the function $f(x)=x^3-2$.

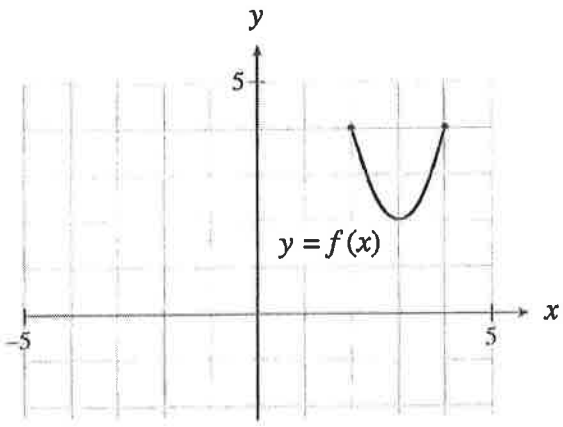
A. $f^{-1}(x)=\sqrt[3]{x+2}$

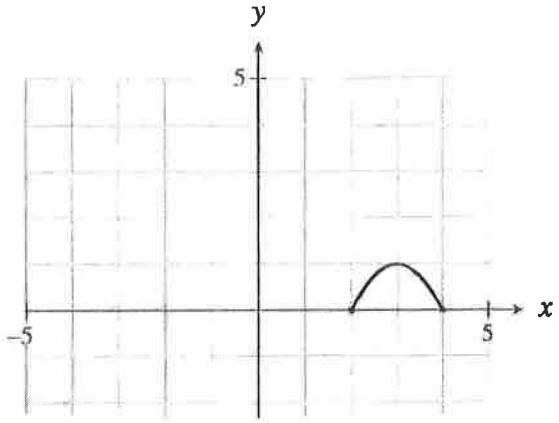
B. $f^{-1}(x)=\sqrt[3]{x}+2$

C. $f^{-1}(x)=\sqrt[3]{x}-2$

D. $f^{-1}(x)=\sqrt[3]{x-2}$

77. The graph of $y=f(x)$ is shown below on the left. Determine an equation of the function graphed on the right.





A. $y=-\frac{1}{2}f(x)$ B. $y=-\frac{1}{2}f(x)+2$ C. $y=-\frac{1}{2}f(x)+3$ D. $y=-\frac{1}{2}f(x)+4$

78. If the point $(6, -12)$ is on the graph of $y=f(x)$, which point must be on the graph of $y=f\left(-\frac{1}{3}x+6\right)$?

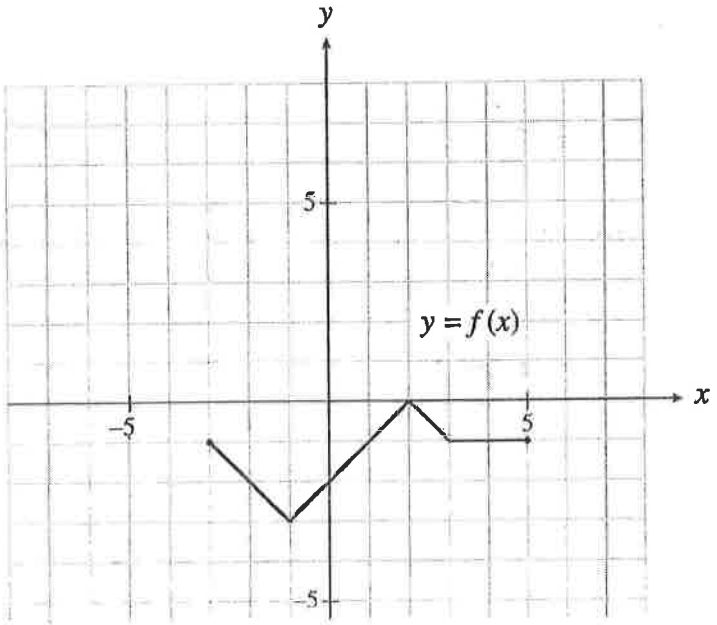
A. $(-36, -12)$

B. $(-24, -12)$

C. $(0, -12)$

D. $(16, -12)$

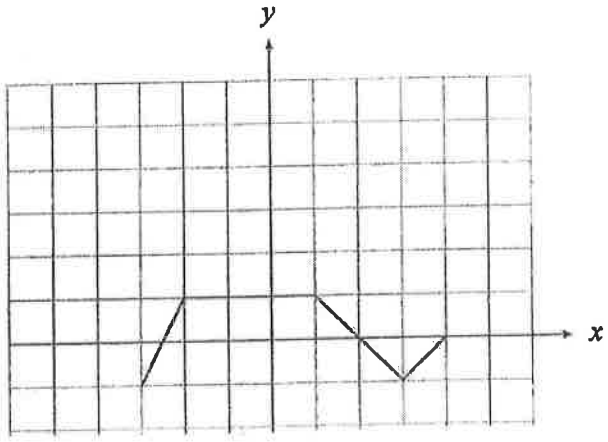
The graph of $y = f(x)$ is shown



79. On the grid provided, sketch the graph of $y = -|f(x)+2|$.

80. On the grid provided, sketch the graph of $y = \frac{1}{f(x)}$.

81. Given the graph of $f(x)$ below, sketch $g(x) = 3|f(x)|-2$.



82. For the function $f(x) = \frac{1}{x+3}$:

a) determine the equation that defines the inverse function, $f^{-1}(x)$.

b) sketch the graphs of $y = f(x)$ and $y = f^{-1}(x)$ on the grid provided.

83. If the graph of $2x+3y=5$ is translated 4 units up, determine an equation of the new graph.

A. $2x+3y=1$
B. $2x+3y=9$
C. $2x+3(y+4)=5$
D. $2x+3(y-4)=5$

84. If $(a,\ b)$ is a point on the graph of $y=f(x)$, determine a point on the graph of $y=f(x-2)+3$.

A. $(a-2,\ b+3)$ B. $(a-2,\ b-3)$ C. $(a+2,\ b+3)$ D. $(a+2,\ b-3)$

85. If the point $(2,-8)$ is on the graph of $y=f(x-3)+4$, what point must be on the graph of $y=f(x)$?

A. $(-1,\ -12)$ B. $(-1,\ -4)$ C. $(5,\ -12)$ D. $(5,\ -4)$

86. How is the graph of $y=7^{3x}$ related to the graph of $y=7^x$?

A. The graph of $y=7^x$ has been expanded vertically by a factor of 3.
B. The graph of $y=7^x$ has been compressed vertically by a factor of $\frac{1}{3}$.
C. The graph of $y=7^x$ has been expanded horizontally by a factor of 3.
D. The graph of $y=7^x$ has been compressed horizontally by a factor of $\frac{1}{3}$.

87. If the graph of $x^2+y^2=4$ is vertically compressed by a factor of $\frac{1}{5}$, then reflected in the y-axis, determine an equation for the new graph.

A. $x^2+\frac{y^2}{25}=4$
B. $-x^2+25y^2=4$
C. $x^2+25y^2=4$
D. $-x^2+\frac{y^2}{25}=4$

88. The graph of $y=-f(x)$ is a reflection of the graph of $y=f(x)$ in

A. the y-axis.
B. the x-axis.
C. the line $y=x$.
D. the line $y=-x$.

89. What is the inverse of the relation $y = x^3$?

A. $y = \frac{1}{x^3}$

B. $x = y^3$

C. $y = (-x)^3$

D. $x = y^{\frac{1}{3}}$

90. The point $(6, -12)$ is on the graph of the function $y = f(x)$. Which point must be on the graph of the function $y = 3f(-x)$?

A. $(-6, -36)$ B. $(6, 36)$ C. $(-6, -4)$ D. $(6, 4)$

91. If $f(x) = \frac{2x}{x-1}$, determine the equation of $f^{-1}(x)$, the inverse of $f(x)$.

A. $f^{-1}(x) = \frac{x}{x-2}$

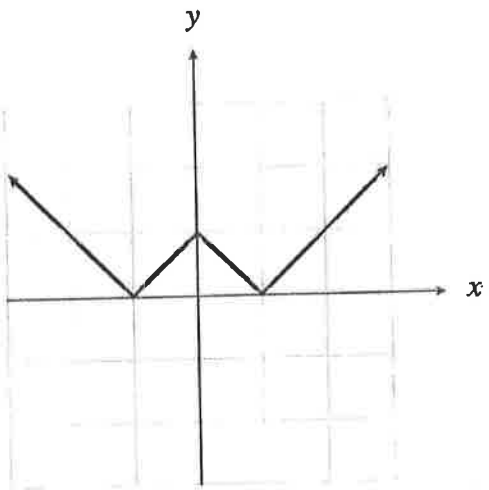
B. $f^{-1}(x) = \frac{2x}{2x-1}$

C. $f^{-1}(x) = \frac{x-1}{2x}$

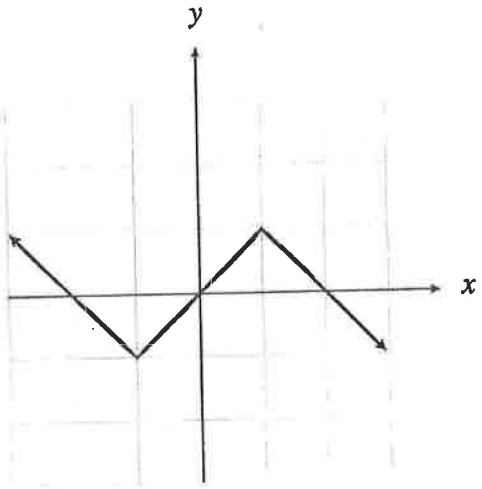
D. $f^{-1}(x) = \frac{1}{x-2}$

92. For which graph of $y = f(x)$ would $f(-x) = -f(x)$?

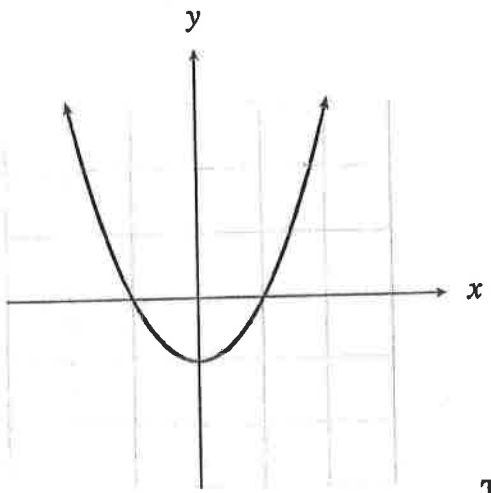
A.



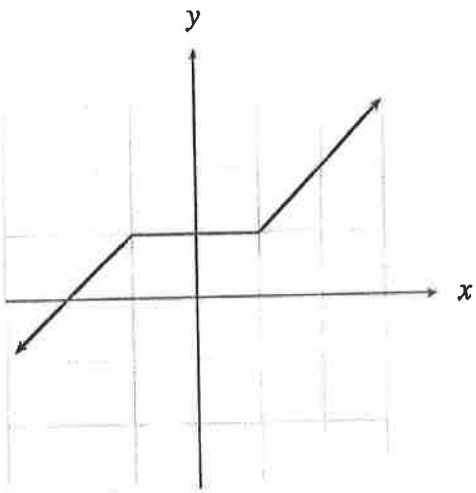
B.



C.



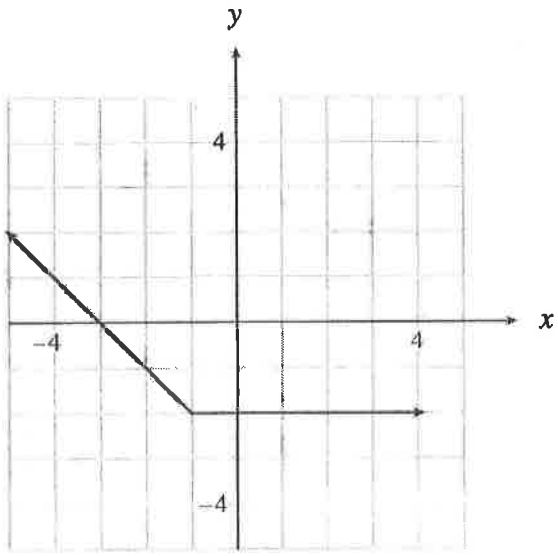
D.



93. When the graph of $y = f(x)$ is transformed to the graph of $y = f(-x)$, on which line(s) will the invariant points lie?

A. $y = 0$ B. $x = 0$ C. $y = x$ D. $y = 1,\ y = -1$

94. Given the graph of $y = f(x)$ below, determine an equation of an asymptote for the graph of $y = \frac{1}{f(x)}$.



A. $x = 3$ B. $x = -3$ C. $y = -2$ D. $y = 2$

95. If the range of $y = f(x)$ is $-1 \le y \le 2$, what is the range of $y = \frac{1}{f(x)}$?

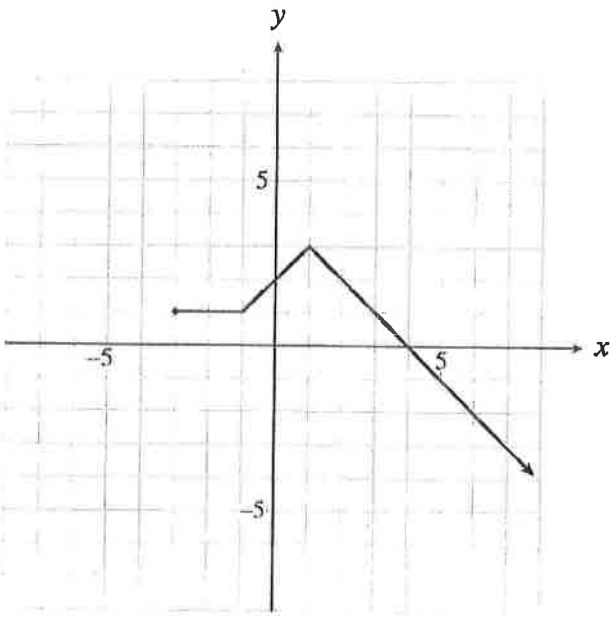
A. $-1 \le y \le \frac{1}{2}$ B. $-1 \le y \le \frac{1}{2},\ y \neq 0$

C. $y \ge \frac{1}{2}$ or $y \le -1$ D. $y \ge 2$ or $y \le -1$

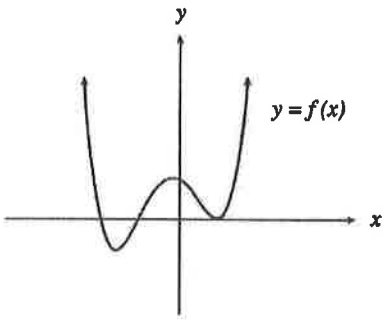
96. The graph of $y = f(x)$ is transformed to the graph of $y = \frac{1}{f(x)}$. If the following points are on the graph of $y = f(x)$, which point would be invariant?

A. $(1, 2)$ B. $(2, 1)$ C. $(3, 0)$ D. $(0, 3)$

97. The graph of $y = f(x)$ is shown below. Sketch the graph of $y = \frac{1}{f(x)}$.

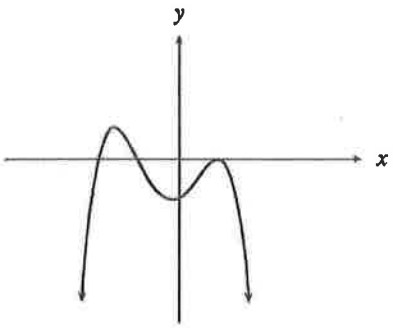


98. The graph of the function $y = f(x)$ is shown below.

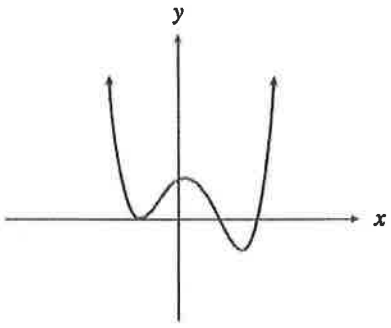


Which of the following is the graph of $y = |f(x)|$?.

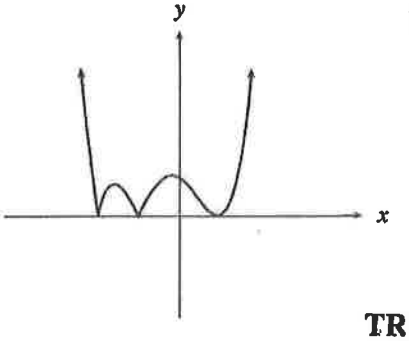
A.



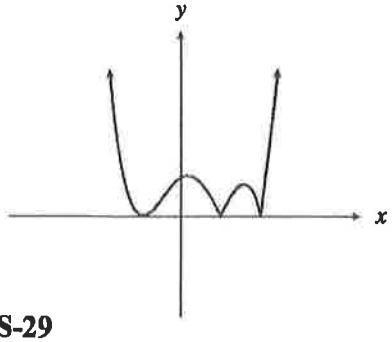
B.



C.



D.



99. If the range of $y = f(x)$ is $-3 \le y \le 5$, what is the range of $y = |f(x)|$?

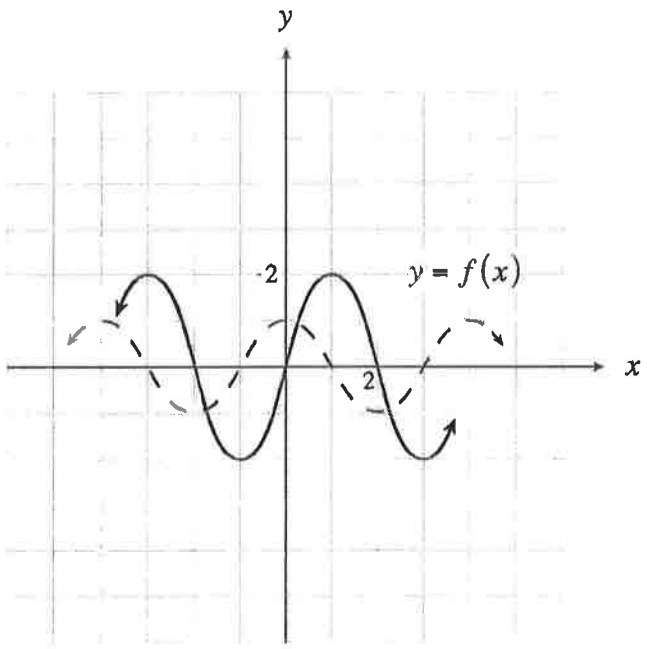
A. $-3 \le y \le 5$ B. $0 \le y \le 3$ C. $0 \le y \le 5$ D. $3 \le y \le 5$

100. Determine an equation that will cause the graph of $y = f(x)$ to expand vertically by a factor of 4 and then translate 3 units up.

A. $y = \frac{1}{4} f(x) + 3$ B. $y = \frac{1}{4} f(x) - 3$

C. $y = 4f(x) + 3$ D. $y = 4f(x) - 3$

101. In the diagram below, $y = f(x)$ is graphed as a broken line.

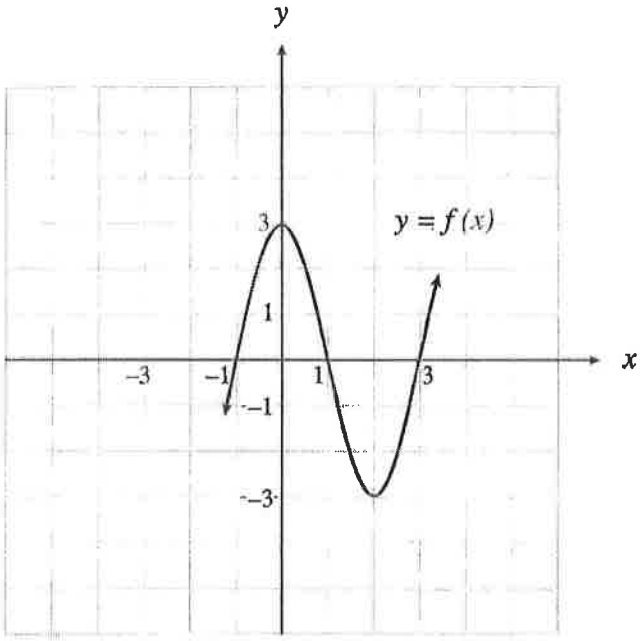


Which equation is defined by the solid line?

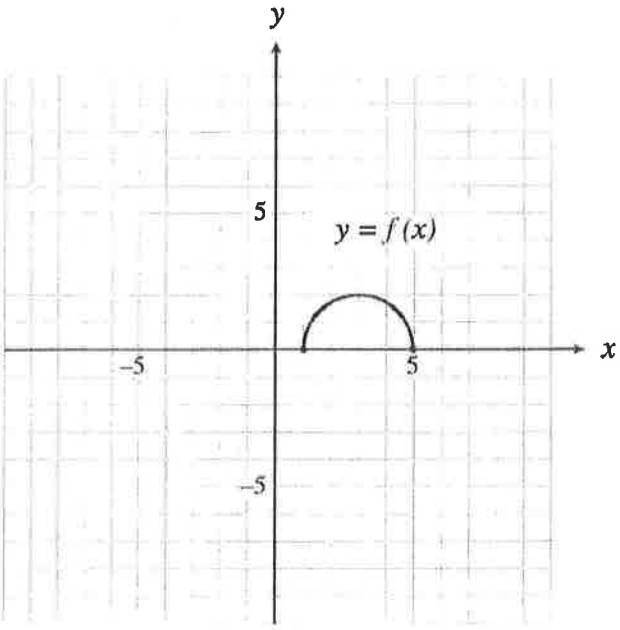
A. $y = 2f(x+1)$ B. $y = f(2x-1)$

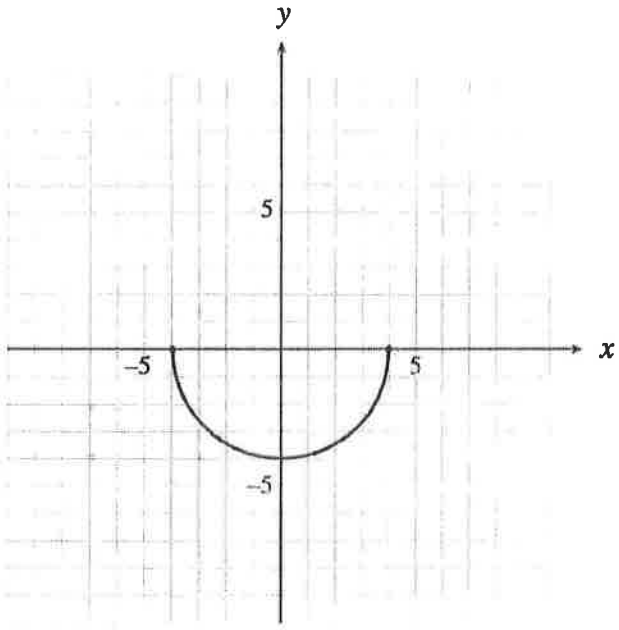
C. $y = f(2x+1)$ D. $y = 2f(x-1)$

102. The graph of $y = f(x)$ is shown below. Sketch the graph of $y = -f\left(\frac{1}{2}(x+2)\right)$.



103. The graph of $y = f(x)$ is shown below on the left. Which equation represents the graph shown on the right?





A. $y = -2f(2x+3)$

B. $y = -2f(2x+6)$

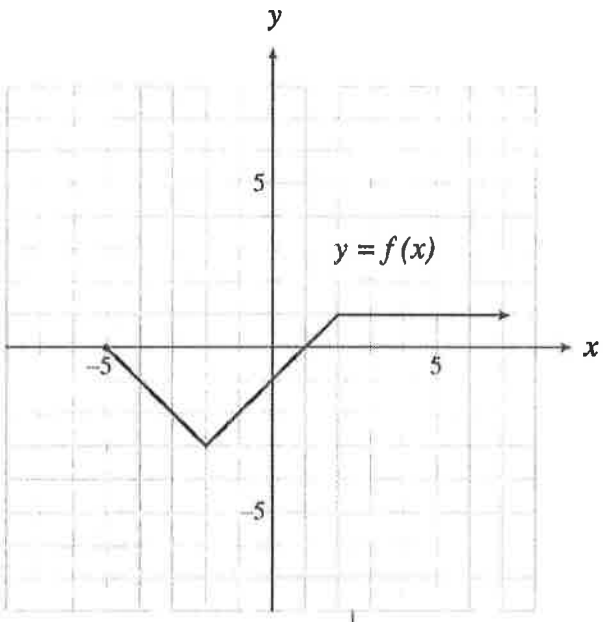
C. $y = -2f\left(\frac{1}{2}x+3\right)$

D. $y = -2f\left(\frac{1}{2}x+6\right)$

104. If the point $(6, -2)$ is on the graph $y = f(x)$, which point must be on the graph of $y = \frac{1}{f(-x)+4}$?

A. $\left(-10, -\frac{1}{2}\right)$ B. $\left(-6, \frac{1}{2}\right)$ C. $\left(-6, \frac{7}{2}\right)$ D. $\left(-\frac{1}{6}, 2\right)$

105. The graph of $y = f(x)$ is shown below.



a) Sketch the graph of:

$$y = 2\left|f(x)\right| + 1$$

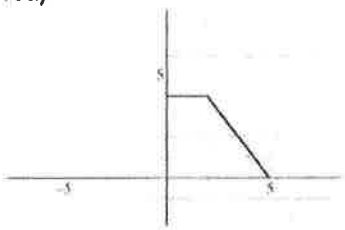
b) Sketch the graph of:

$$y = 2\left|f(x) + 1\right|$$

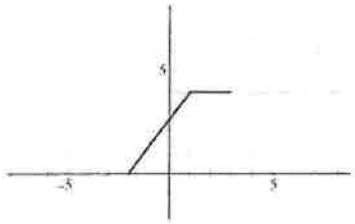
TRANSFORMATIONS

1 D
2 C
3 A
4 A
5 B
6 D
7 A
8 C
9 B

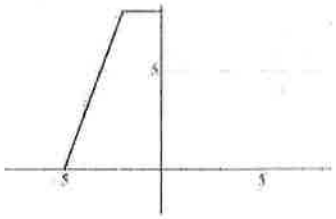
10a)



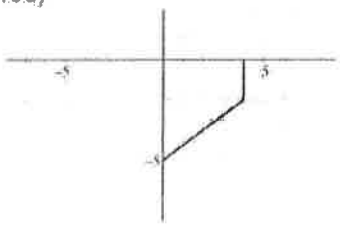
10b)



10c)

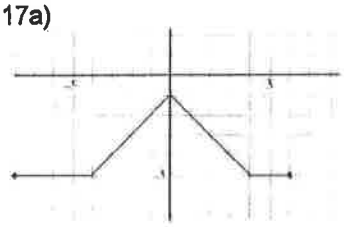


10d)

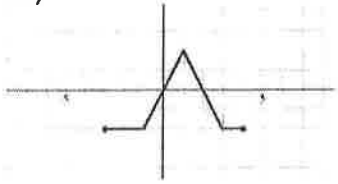


11 B
12 C
13 B
14 D
15 A
16 D

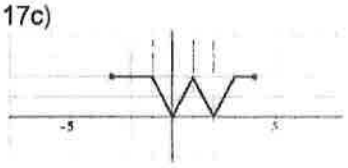
17a)



17b)

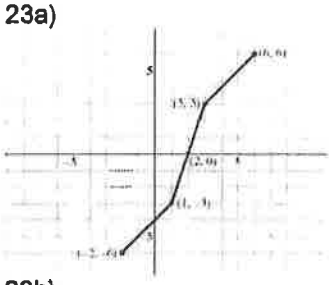


17c)

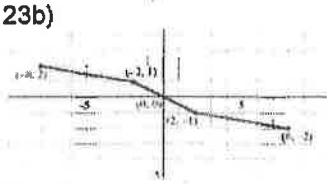


18 A
19 A
20 A
21 A
22 B

23a)

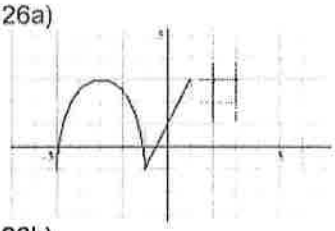


23b)

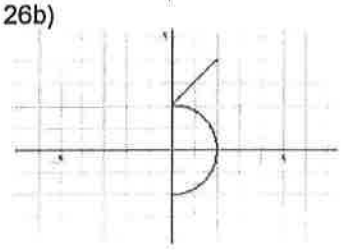


24 D
25 A

26a)

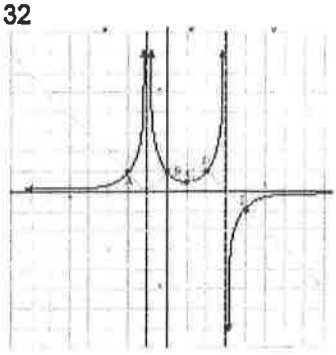


26b)



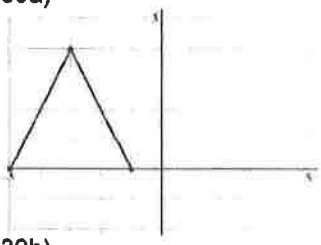
27 A
28 B
29 A
30 D
31 A

32

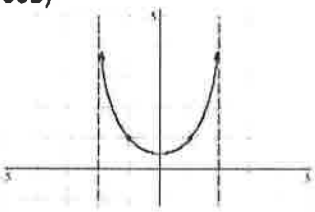


33 A
34 A
35 B
36 B
37 C
38 B

39a)

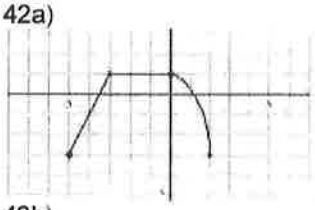


39b)

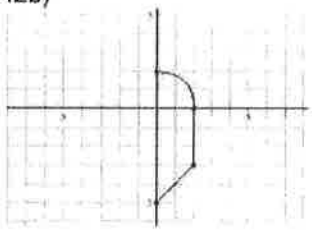


40 B
41 B

42a)

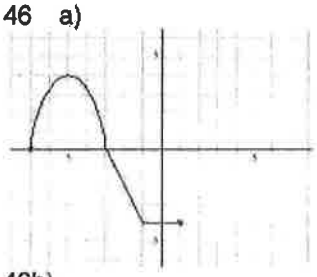


42b)

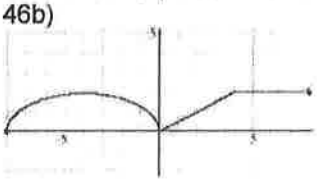


43 A
44 A
45 C

46 a)

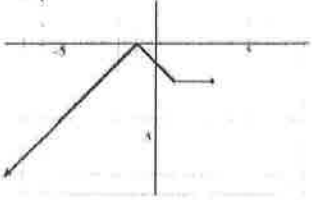


46b)

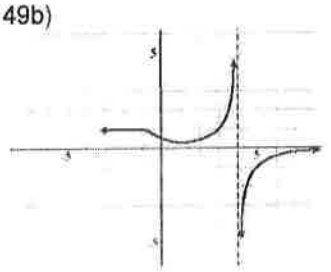


47 A
48 D

49a)

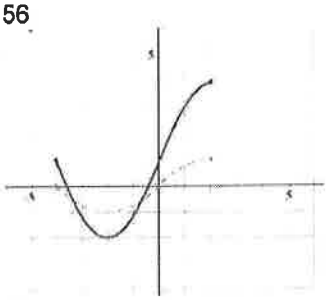


49b)

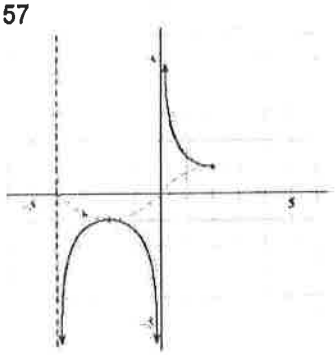


50 C
51 D
52 A
53 B
54 D
55 D

56

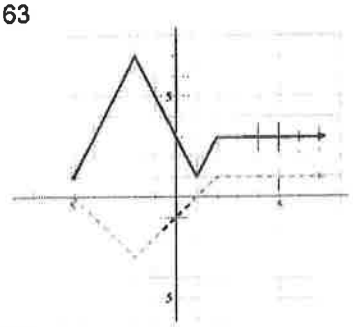


57

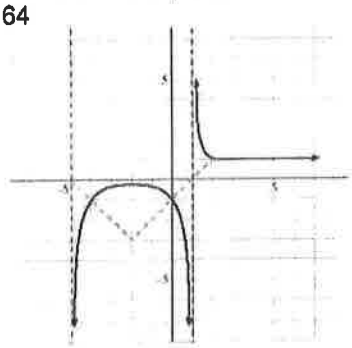


58 A
59 B
60 B
61 A
62 B

63

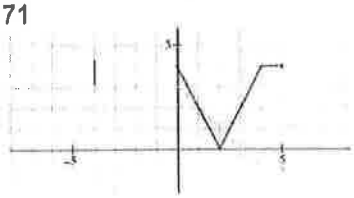


64

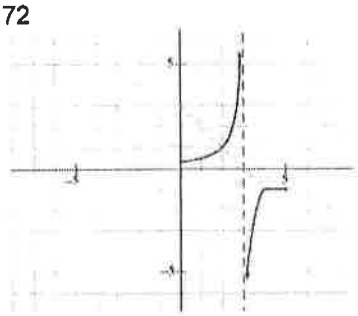


65 C
66 A
67 A
68 B
69 A
70 C

71

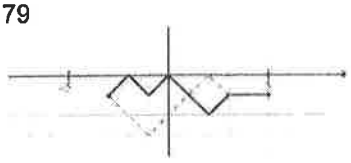


72

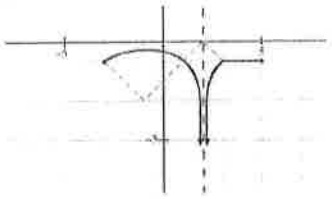


73 C
74 B
75 A
76 A
77 B
78 C

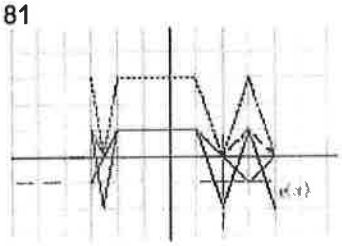
79



80

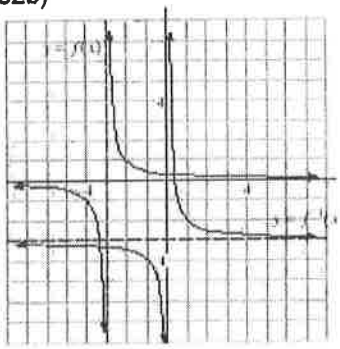


81



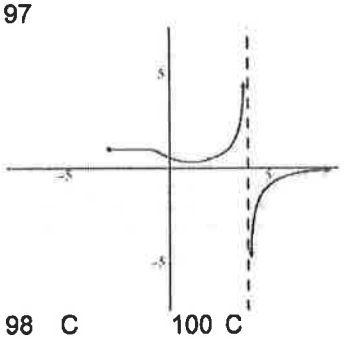
82a) $f^{-1}(x) = \frac{1}{x} - 3$

82b)



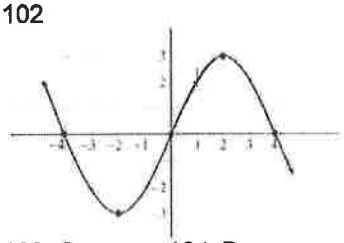
83 D
84 C
85 A
86 D
87 ~~C~~
88 B
89 B
90 A
91 A
92 B
93 B
94 B
95 C
96 B

97



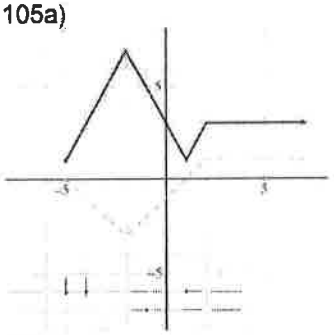
98 C
99 C
100 C
101 D

102



103 C
104 B

105a)



105b)