

Review notes

PMATH 12 – FINAL NOTE OUTLINE – CH 1-8

CHAPTER 1 – Polynomial Expressions and Functions

1. dividing – synthetic, long division, remainder theorem

2. factoring – using synthetic division
– graphing calc.

$$x^4 + 6x^3 + 3x^2 - x - 10$$

– max factors
– x int
possible $\pm 1, \pm 2, \pm 5, \pm 10$

3. polynomial functions and equations

types – linear, quadratic, cubic, quartic, quintic

categories – odd/even degree

lead coeff – coeff of the highest power

4. solve problems

CHAPTER 2 – Radical and Rational Functions

1. radical functions

$$y = \sqrt{x}$$

restrictions $x \geq 0$

2. rational functions

$$y = \frac{1}{x}$$

restriction $x \neq 0$

asymptotes – vert. – denom $\neq 0$
– hor. – exp. equal $\rightarrow$ lead coeff $= \frac{\#}{\#} = \boxed{\#} \neq y$
– top exp $<$ bott. exp $\rightarrow y \neq 0$
– oblique – top exp one more than bottom exp
holes – when the question simplifies to a linear function

CHAPTER 3 – Transforming Graphs of Functions

1. translating

$$y = f(x-h) + k$$

2. reflecting

$$y = -f(x)$$

in x axis

$$y = f(-x)$$

in y axis

3. stretch, compress

$$\begin{array}{l} \text{vert.} \rightarrow y = af(x) \\ (x, ay) \end{array} \quad \left. \begin{array}{l} 0 < |a| < 1 \text{ comp.} \\ |a| > 1 \text{ str.} \end{array} \right\} \quad \begin{array}{l} \text{hor} \rightarrow y = f(bx) \\ (\frac{x}{b}, y) \end{array} \quad \left. \begin{array}{l} 0 < |b| < 1 \text{ str.} \\ |b| > 1 \text{ comp.} \end{array} \right\}$$

4. combinations

$$u = a + \left[\frac{1}{n} \right] \pm b \quad (n \dots) \Rightarrow (x+h, au+b)$$

4. combinations

$$y = af[b(x-h)] + k \quad (x,y) \Rightarrow \left(\frac{x}{b}+h, ay+k\right)$$

5. inverse

$$(x,y) \Rightarrow (y,x)$$

$$y = x^2 + 2$$

- exchange x, y
- solve for y

CHAPTER 4 – Combining Functions

1. combine functions – graphically

$+ / - / \times / \div$

- algebraically

$f+g / f-g / f \times g / f \div g$

$$f(x) = 2x - 1$$

$$g(x) = 3x + 2$$

$$f - g = (2x - 1) - (3x + 2) = 2x - 1 - 3x - 2 = -x - 3$$

$$f \div g = \frac{2x - 1}{3x + 2}$$

Restrictions

2. composite functions

$$\begin{aligned} f(g(x)) &= f(3x+2) = 2(3x+2) - 1 \\ &= 6x + 4 - 1 \\ &= 6x + 3 \end{aligned}$$

CHAPTER 5 – Exponential & Logarithmic Functions

1. exponential – functions $y = ca^{d(x-h)} + k$

- equations - solve $9^{x+1} = 243^{x+3}$

2. Logarithms – functions $\log_b c = a$ then $c = b^a$ $\log_b b^n = n$

- laws – product

quotient

power

$$\log_b xy = \log_b x + \log_b y$$

$$\log_b \frac{x}{y}$$

$$= \log_b x - \log_b y \quad \log_b x^k = k \log_b x$$

- equations $y = c \log_a d(x-h) + k$

CHAPTER 6 – Trigonometry

1. trig ratios – standard position – 4 quads, CAST, 30, 45, 60

2. radian –

π

radians – 180 – RAD “mode” on calculator

3. **trig functions** – transformations $y = a \sin b(x - c) + d$ $y = a \cos b(x - c) + d$

CHAPTER 7 – Trigonometry Equations & Identities

1. **solve trig equations** – graph, algebra

2. **identities** – reciprocal, quotient, Pythagorean, sum/diff, double angle (formula sheet)

CHAPTER 8 – Permutations & Combinations

1. **fundamental counting principal**

2. **permutations** ${}_nP_r = \frac{n!}{(n-r)!}$

3. **combinations** ${}_nC_r = \frac{n!}{(n-r)!r!}$

4. **binomial theorem** $(x + y)^n = {}_nC_0 x^n + {}_nC_1 x^{n-1}y + {}_nC_2 x^{n-2}y^2 + \dots + {}_nC_{n-1} xy^{n-1} + {}_nC_n y^n$

General term $(x + y)^n$ find the 'k'th term ${}_nC_{k-1} x^{n-(k-1)} y^{k-1}$