

I. Simplify.

1. $\frac{x-4}{x^2-3x-4}$

2. $\frac{x^3-8}{x-2}$

3. $\frac{5-x}{x^2-25}$

4. $\frac{x^2-4x-32}{x^2-16}$

II. Fill in.

1. The 3 Pythagorean Identities: _____

2. $\cos(2x) =$ _____

3. $\sin(2x) =$ _____

III. Simplify.

1. $\frac{1}{x+h} - \frac{1}{x}$

2. $\frac{2}{\frac{x^2}{10} - \frac{1}{x^5}}$

3. $\frac{\frac{1}{3+x} - \frac{1}{3}}{x}$

4. $\frac{2x}{x^2-6x+9} - \frac{1}{x+1} - \frac{8}{x^2-2x-3}$

IV. Solve for z.

1. $4x + 10yz = 0$

2. $y^2 + 3yz - 8z - 4x = 0$

V. If $f(x) = \{(3,5), (2,4), (1,7)\}$, $g(x) = \sqrt{x-3}$, $h(x) = \{(3,2), (4,3), (1,6)\}$ and $k(x) = x^2 + 5$, find:

1. $(f+h)(1)$

2. $(k-g)(5)$

3. $(f \circ h)(3)$

4. $(g \circ k)(7)$

5. $f^{-1}(x)$

6. $k^{-1}(x)$

7. $\frac{1}{f(x)}$

8. $(kg)(x)$

VI. Follow the directions for each problem.

1. Evaluate $\frac{f(x+h) - f(x)}{h}$ and simplify if $f(x) = x^2 - 2x$.

2. Expand $(x+y)^3$

3. Simplify $x^{\frac{3}{2}} \left(x + x^{\frac{5}{2}} - x^2 \right)$

VII. Expand and simplify.

1. $\sum_{n=0}^4 \frac{n^2}{2}$

2. $\sum_{n=1}^3 \frac{1}{n^3}$

VIII. Simplify.

1. $\frac{\sqrt{x}}{x}$

2. $e^{\ln 3}$

3. $e^{(1+\ln x)}$

4. $\ln 1$

5. $\ln e^7$

6. $\log_3\left(\frac{1}{3}\right)$

7. $\log_{1/2} 8$

8. $\ln \frac{1}{2}$

9. $e^{3\ln x}$

10. $\frac{4xy^{-2}}{12x^{-1/3}y^{-5}}$

11. $27^{2/3}$

12. $(5a^{2/3})(4a^{3/2})$

13. $(4a^{5/3})^{3/2}$

14. $\frac{3(n+1)!}{5n!}$

IX. Using the point-slope form $y - y_1 = m(x - x_1)$, write an equation for the line:

1. with slope -2 , containing the point $(3,4)$

2. containing the points $(1,-3)$ and $(-5,2)$

3. with slope 0 , containing the point $(4,2)$

4. parallel to $2x - 3y = 7$ and passing through $(5,1)$

5. perpendicular to the line in problem #1, containing the point $(3,4)$

7. $12x^2 = 3x$

8. $\sin 2x = \sin x, 0 \leq x \leq 2\pi$

9. $|x-3| < 7$

10. $(x+1)^2(x-2) + (x+1)(x-2)^2 = 0$

11. $27^{2x} = 9^{x-3}$

12. $\log x + \log(x-3) = 1$

13. $e^{3x} = 5$

XIV. Graph each. State the domain and range.

1. $y = \sin x$

2. $y = \cos x$

3. $y = \tan x$

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

5. $y = x^2 - 6x + 1$

6. $y = \frac{x+4}{x-1}$

7. $y = \frac{x^2 - 4}{x + 2}$

8. $y = e^x$

9. $y = \sqrt{x}$

$$10. y = \sqrt[3]{x}$$

$$11. y = \ln x$$

$$12. y = |x+3| - 2$$

$$13. y = \frac{1}{x}$$

$$14. y = \begin{cases} x^2, & \text{if } x < 0 \\ x+2, & \text{if } 0 \leq x \leq 3 \\ 4, & \text{if } x > 3 \end{cases}$$

ANSWER KEY

SECTION I:

$$1. \frac{1}{X+1} \quad 2. x^2 + 2X + 4 \quad 3. \frac{-1}{X+5} \quad 4. \frac{X-8}{X-4}$$

SECTION II:

$$\begin{array}{lll} 1. \sin^2 x + \cos^2 x = 1 & \sec^2 x = 1 + \tan^2 x & \csc^2 x = 1 + \cot^2 x \\ 2. \cos^2 x - \sin^2 x & 2\cos^2 x - 1 & 1 - 2\sin^2 x \\ 3. 2\sin x \cos x & & \end{array}$$

SECTION III:

$$1. \frac{-h}{x(x+h)} \quad 2. \frac{x^3}{5} \quad 3. \frac{-1}{3(x+3)} \quad 4. \frac{x^2+15}{(x-3)^2(x-1)}$$

SECTION IV:

$$1. z = \frac{-2x}{5y} \quad 2. z = \frac{4x - y^2}{3y - 8}$$

SECTION V:

$$\begin{array}{llll} 1. 13 & 2. 30 - \sqrt{2} & 3. 4 & 4. \sqrt{51} \quad 5. f^{-1} = \{(5, 3), (4, 2), (7, 1)\} \\ 6. k^{-1} = \sqrt{x-5}, x \geq 5 & 7. \frac{1}{f(x)} = \left\{ \left(3, \frac{1}{5} \right), \left(2, \frac{1}{4} \right), \left(1, \frac{1}{7} \right) \right\} & & 8. (kg)(x) = k(x) \cdot g(x) = (x^2 + 5)\sqrt{x-3} \end{array}$$

SECTION VI:

$$1. 2x + h - 2 \quad 2. x^3 + 3x^2y + 3xy^2 + y^3 \quad 3. x^{\frac{5}{2}} + x^4 - x^{\frac{7}{2}}$$

SECTION VII:

$$1. 15 \quad 2. \frac{251}{216}$$

SECTION VIII:

$$1. \frac{1}{\sqrt{x}} \text{ (SIMPLIFY MEANS WRITE ANOTHER WAY)} \quad 2. 3 \quad 3. \text{ex} \quad 4. 0 \quad 5. 7 \quad 6. -1 \quad 7. -3 \quad 8. -\ln 2$$

$$9. x^3 \quad 10. \frac{x^{\frac{4}{3}}y^3}{3} \quad 11. 9 \quad 12. 20a^{\frac{13}{6}} \quad 13. 8a^{\frac{5}{2}} \quad 14. \frac{3(n+1)}{5}$$

SECTION IX:

$$\begin{array}{lll} 1. y - 4 = -2(x - 3) & 2. y + 3 = -\frac{5}{6}(x - 1) \text{ or } y - 2 = -\frac{5}{6}(x + 5) & 3. y = 2 \\ 4. y - 1 = \frac{2}{3}(x - 5) & 5. y - 4 = \frac{1}{2}(x - 3) & \end{array}$$

SECTION X:

1. 0 2. 1 3. $\frac{\sqrt{2}}{2}$ 4. -1 5. $\frac{-\sqrt{3}}{2}$ 6. $\frac{1}{2}$ 7. -1
 8. $\frac{\sqrt{3}}{3}$ 9. $-\sqrt{3}$ 10. UNDEFINED 11. $\frac{\sqrt{3}}{2}$ 12. $\frac{-\pi}{6}$

SECTION XI:

1. $domain = [4, \infty)$ $range = [0, \infty)$ 2. $d = [2, \infty) \cup (-\infty, -2]$ $r = [0, \infty)$
 3. $d = [-2, 2]$ $r = [0, 2]$ 4. $d = (-\infty, \infty)$ $r = [2, \infty)$

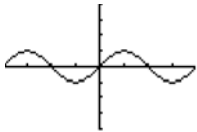
SECTION XII:

1. (5, 36) (-3, -4) 2. $\left(\frac{\pi}{4}, \frac{\sqrt{2}}{2}\right)$

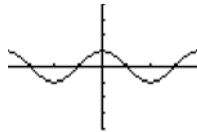
SECTION XIII:

1. -6, 3 2. ± 1 3. 8, 2 4. $\frac{-5 \pm \sqrt{89}}{4}$ 5. $(-\infty, -3) \cup (3, \infty)$ 6. [-3, 5] 7. 0, $\frac{1}{4}$
 8. 0, π , 2π , $\frac{\pi}{3}$, $\frac{5\pi}{3}$ 9. (-4, 10) 10. -1, $\frac{1}{2}$, 2 11. $\frac{-3}{2}$ 12. 5 only! 13. $\frac{\ln 5}{3}$

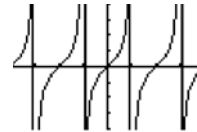
SECTION XIV:



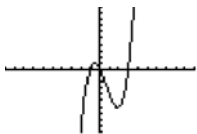
1. D: $(-\infty, \infty)$
 R: $[-1, 1]$



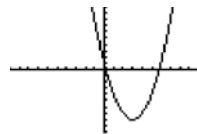
2. D: $(-\infty, \infty)$
 R: $[-1, 1]$



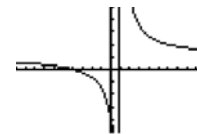
3. D: $\left\{x : x \neq \frac{(2k+1)\pi}{2}\right\}$
 R: $(-\infty, \infty)$



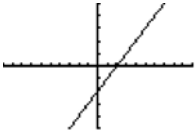
4. D: $(-\infty, \infty)$
 R: $(-\infty, \infty)$



5. D: $(-\infty, \infty)$
 R: $[-8, \infty)$



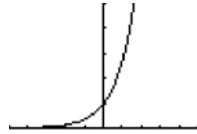
6. D: $\{x : x \neq 1\}$
 R: $\{y : y \neq 1\}$



hole @ (-2,-4)

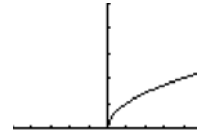
7. D: $\{x : x \neq -2\}$

R: $\{y : y \neq -4\}$



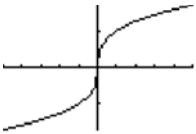
8. D: $(-\infty, \infty)$

R: $(0, \infty)$



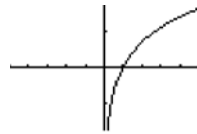
9. D: $[0, \infty)$

R: $[0, \infty)$



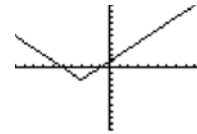
10. D: $(-\infty, \infty)$

R: $(-\infty, \infty)$



11. D: $(0, \infty)$

R: $(-\infty, \infty)$



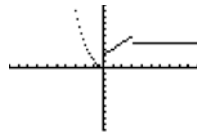
12. D: $(-\infty, \infty)$

R: $[2, \infty)$



13. D: $\{x : x \neq 0\}$

R: $\{y : y \neq 0\}$



14. D: $(-\infty, \infty)$

R: $(0, \infty)$