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

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

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

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:

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

III. Simplify.

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

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

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

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.  $e^{\ln 3}$ 

2. 
$$e^{\ln 3}$$

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

5. 
$$\ln e^{7}$$

6. 
$$\log_3(\frac{1}{3})$$
 7.  $\log_{1/2} 8$  8.  $\ln \frac{1}{2}$ 

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. 
$$27^{\frac{2}{3}}$$

11. 
$$27^{\frac{2}{3}}$$
 12.  $(5a^{\frac{2}{3}})(4a^{\frac{3}{2}})$  13.  $(4a^{\frac{5}{3}})^{\frac{3}{2}}$ 

13. 
$$\left(4a^{\frac{5}{3}}\right)^{\frac{3}{2}}$$

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)

X. Determine the exact value of each.

2. 
$$\sin \frac{\pi}{2}$$

2. 
$$\sin \frac{\pi}{2}$$
 3.  $\sin \frac{3\pi}{4}$  4.  $\cos \pi$  5.  $\cos \frac{7\pi}{6}$  6.  $\cos \frac{\pi}{3}$ 

5. 
$$\cos \frac{7\pi}{6}$$

6. 
$$\cos \frac{\pi}{3}$$

7. 
$$\tan \frac{7\pi}{4}$$

8. 
$$\tan \frac{\pi}{6}$$

9. 
$$\tan \frac{2\pi}{3}$$

10. 
$$\tan \frac{\pi}{2}$$

11. 
$$\cos\left(\sin^{-1}\frac{1}{2}\right)$$

7. 
$$\tan \frac{7\pi}{4}$$
 8.  $\tan \frac{\pi}{6}$  9.  $\tan \frac{2\pi}{3}$  10.  $\tan \frac{\pi}{2}$  11.  $\cos \left( Sin^{-1} \frac{1}{2} \right)$  12.  $Sin^{-1} \left( \sin \frac{7\pi}{6} \right)$ 

# XI. Determine the domain and range.

$$1. \quad y = \sqrt{x - 4}$$

1. 
$$y = \sqrt{x-4}$$
 2.  $y = \sqrt{x^2-4}$ 

3. 
$$y = \sqrt{4 - x^2}$$

3. 
$$y = \sqrt{4 - x^2}$$
 4.  $y = \sqrt{x^2 + 4}$ 

## XII. Determine all points of intersection.

1. 
$$y = x^2 + 3x - 4$$
 and  $y = 5x + 11$ 

2. 
$$y = \cos x$$
 and  $y = \sin x$  in the first quadrant

XIII. Solve for x, where x is a real number.

1. 
$$x^2 + 3x - 4 = 14$$
 2.  $\frac{x^4 - 1}{x^3} = 0$ 

$$2. \ \frac{x^4 - 1}{x^3} = 0$$

3. 
$$(x-5)^2 = 9$$

4. 
$$2x^2 + 5x = 8$$

4. 
$$2x^2 + 5x = 8$$
 5.  $(x+3)(x-3) > 0$  6.  $x^2 - 2x - 15 \le 0$ 

6. 
$$x^2 - 2x - 15 \le 0$$

7. 
$$12x^2 = 3x$$

8. 
$$\sin 2x = \sin x$$
,  $0 \le x \le 2\pi$  9.  $|x-3| < 7$ 

9. 
$$|x-3| < 7$$

10. 
$$(x+1)^2(x-2) + (x+1)(x-2)^2 = 0$$
 11.  $27^{2x} = 9^{x-3}$ 

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

12. 
$$\log x + \log(x - 3) = 1$$
 13.  $e^{3x} = 5$ 

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

XIV. Graph each. State the domain and range.

1. 
$$y = \sin x$$

2. 
$$y = \cos x$$

3. 
$$y = \tan x$$

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

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

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

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

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

## ANSWER KEY

SECTION I:

$$1. \ \frac{1}{X+1}$$

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

3. 
$$\frac{-1}{X+5}$$

4. 
$$\frac{X-8}{X-4}$$

SECTION II:

$$\sec^2 x = 1 + \tan^2 x$$

$$\csc^2 x = 1 + \cot^2 x$$

2. 
$$\cos^2 x - \sin^2 x$$

$$2\cos^2 x - 1$$

SECTION III:

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

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

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

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

SECTION IV:

$$1. \ Z = \frac{-2x}{5y}$$

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

SECTION V:

2. 
$$30 - \sqrt{2}$$
 3. 4

4. 
$$\sqrt{51}$$
 5.  $f^{-1} = \{(5,3), (4,2), (7,1)\}$ 

6. 
$$k^{-1} = \sqrt{x-5}, x \ge 5$$

6. 
$$k^{-1} = \sqrt{x-5}, x \ge 5$$
 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.  $(kg)(x) = k(x) \cdot g(x) = (x^2 + 5)\sqrt{x-3}$ 

8. 
$$(kg)(x) = k(x) \cdot g(x) = (x^2 + 5)\sqrt{x - 3}$$

**SECTION VI:** 

1. 
$$2x + h - 2$$

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

3. 
$$x^{\frac{5}{2}} + x^4 - x^{\frac{7}{2}}$$

SECTION VII:

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

SECTION VIII:

1. 
$$\frac{1}{\sqrt{X}}$$
 (SIMPLIFY MEANS WRITE ANOTHER WAY) 2. 3 3. ex 4. 0 5. 7 6. -1 7. -3 8. -ln2

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

12. 
$$20a^{\frac{13}{6}}$$

13. 
$$8a^{\frac{5}{2}}$$

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

SECTION IX:

1. 
$$y-4=-2(x-3)$$

1. 
$$y-4=-2(x-3)$$
 2.  $y+3=-\frac{5}{6}(x-1)$  or  $y-2=-\frac{5}{6}(x+5)$  3.  $y=2$ 

4. 
$$y-1=\frac{2}{3}(x-5)$$

4. 
$$y-1=\frac{2}{3}(x-5)$$
 5.  $y-4=\frac{1}{2}(x-3)$ 

### SECTION X:

3. 
$$\frac{\sqrt{2}}{2}$$

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. 
$$-\sqrt{3}$$

8. 
$$\frac{\sqrt{3}}{3}$$
 9.  $-\sqrt{3}$  10. UNDEFINED

11. 
$$\frac{\sqrt{3}}{2}$$
 12.  $\frac{-\pi}{6}$ 

12. 
$$\frac{-\pi}{6}$$

#### SECTION XI:

1. 
$$domain = [4, \infty)$$
  $range = [0, \infty)$ 

$$range = [0, \infty]$$

2. 
$$d = [2, \infty) \cup (-\infty, -2]$$
  $r = [0, \infty)$ 

3. 
$$d = [-2, 2]$$
  $r = [0, 2]$ 

4. 
$$d = (-\infty, \infty)$$
  $r = [2, \infty)$ 

$$r = [2, \infty)$$

#### SECTION XII:

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

### SECTION XIII:

$$1. -6, 3$$

4. 
$$\frac{-5 \pm \sqrt{89}}{4}$$

1. 
$$-6, 3$$
 2.  $\pm 1$  3.  $8, 2$  4.  $\frac{-5 \pm \sqrt{89}}{4}$  5.  $(-\infty, -3) \cup (3, \infty)$  6.  $[-3, 5]$  7.  $0, \frac{1}{4}$ 

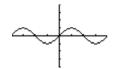
8. 
$$0, \pi, 2\pi, \frac{\pi}{3} \frac{5\pi}{3}$$

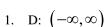
9. 
$$(-4, 10)$$
 10.  $-1, \frac{1}{2}, 2$ 

11. 
$$\frac{-3}{2}$$

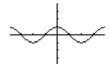
11. 
$$\frac{-3}{2}$$
 12. 5 only! 13.  $\frac{\ln 5}{3}$ 

### SECTION XIV:



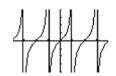


R: 
$$[-1,1]$$



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

R: 
$$[-1,1]$$



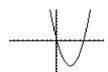
3. D:  $\left\{ x : x \neq \frac{(2k+1)\pi}{2} \right\}$ 

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



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

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



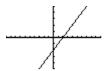
5. D:  $(-\infty,\infty)$ 

R: 
$$\left[-8,\infty\right)$$

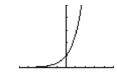


6. D:  $\{x: x \neq 1\}$ 

$$R: \{y: y \neq 1\}$$



hole @ (-2,-4)



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

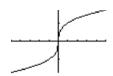
R:  $\{y : y \neq -4\}$ 

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

R:  $(0,\infty)$ 

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

R:  $[0,\infty)$ 





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

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

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

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

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

R:  $[2,\infty)$ 



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

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

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

R:  $(0,\infty)$