This *Instructor's Testing Manual* includes six test forms for each chapter. Forms A - D are in open-ended format. Forms E and F for each chapter are in multiple-choice format.

Contents

Chapter P Test -- Form A **Name:** ________________________

Determine which elements of the set

$\{ -6, -\sqrt{2}, -\frac{3}{4}, 0, 0.121221222\cdots, 1.2, \pi, \frac{16}{5}, 5 \}$

are members of the following sets.

1. Rational numbers: ________________ **2.** Integers: ________________

Evaluate each expression.

3. $3(2-4)^2 + |2-5|$ **4.** $8^{2/3}$ **5.** $-16^{1/4}$ **6.** $\frac{2^3 - 3(4-1)}{(-2-1)(4+(-2))}$

3. ________ 4. ________ 5. ________ 6. ______________

Simplify each expression. Assume that all variables represent positive real numbers.

7. $\frac{(x^2y^6)^{1/2}}{(-2xy)^3}$ **8.** $\frac{(ab-2a^2b)^2}{a^2b}$ **9.** $\frac{\sqrt{27}}{\sqrt{3}-2}$ **10.** $\sqrt[3]{27x^4y^9}$

7. ________ 8. ________ 9. ________ 10. ________

Perform the indicated operations and write the answer in the form $a + bi$, where a and b are real.

11. $(3+2i)^2$ **12.** $i^3 - i^2$

11. ________________________ 12. ________________________

Perform the indicated operations and simplify the results.

13. $(2x^3 - x + 3) - (3x^3 + x^2 - x)$

13. ________________

14. $(2x - 3y)(5x + 4y)$

14. ________________

15. $(2x^3 + x^2 - 3) \div (x - 1)$

15. ________________

16. $\frac{4x}{x^2 - 1} + \frac{x+3}{x^2 - 5x - 6}$

16. ________________

17. $\frac{x^2 + 2x}{x^3 - x^2} \div \frac{x^2 - 5x + 6}{x^2 - 4x + 3}$

17. ________________

18. $\frac{b - b^{-1}}{a + ab^{-1}}$

18. ________________

Factor completely:

19. $a - 16a^5$ **20.** $6x^2 - 5x - 6$ **21.** $8x^3 - 4x^2 - 2x + 1$

19. ________________ 20. ________________ 21. ________________

22. **Perform the indicated operations. Write the answer in scientific notation.**

$\frac{2{,}000{,}000 \times 0.000015}{0.006}$

22. ________________

23. **The polynomial $P(n) = 20n - 0.04n^2$ gives the revenue in dollars on the sale of n t-shirts. Find the revenue for the sale of 50 t-shirts.**

23. ________________

24. **Write a polynomial $P(x)$ that expresses the area of a rectangle whose length is 3 feet more than twice the width.**

24. ________________

Chapter P Test -- Form B **Name:** ____________________

Determine which elements of the set

$\{ -\sqrt{3}, -\frac{5}{4}, 0, 0.12, 0.595959\cdots, \pi, 4 \}$

are members of the following sets.

1. Irrational numbers: ________________ **2.** Natural numbers: ________________

Evaluate each expression:

3. $b^2 - 4ac$, if $\begin{cases} a = -1 \\ b = -2 \\ c = -3 \end{cases}$ **4.** $3 \cdot 2^{-1} + 3 \cdot 2^{-2}$ **5.** $-4^{1/2}$ **6.** $\dfrac{2 - 3[4 - (2-1)^2]}{|2-5|}$

3. _________ 4. _________ 5. _________ 6. ___________

Simplify each expression. Assume that all variables represent positive real numbers.

7. $(2a^2b^3)^2(2ab^2)^{-1}$ **8.** $\sqrt{18x^3} + \sqrt{50x^3} - x\sqrt{128x}$ **9.** $27^{2/3} - 16^{3/4}$ **10.** $\sqrt{32a^5b^6}$

7. _________ 8. _________ 9. _________ 10.___________

Perform the indicated operations and write the answers in the form $a + bi$, where a and b are real.

11. $i(\sqrt{-4} + 3)$ **12.** $i^5 - i^{60}$

11. ________________________ 12. ________________________

Perform the indicated operations and simplify the results.

13. $(4x^2 - 5x + 2) + (x^3 - 5x^2 - x + 2)$

13. __________________

14. $(3x - y)(4x + y)$

14. __________________

15. $\left(3x^3 - x + 2\right) \div (x+1)$

15. ________________

16. $\frac{x}{x-1} - \frac{4}{x}$

16. ________________

17. $\frac{x^2+2x+1}{x^2+3x} \cdot \frac{x^2-2x}{x^2-x-2}$

17. ________________

18. $\frac{\frac{1}{x}+2}{\frac{1}{x}-4x}$

18. ________________

Factor completely.

19. $x^3 + x^2 - 6x$

20. $x^3 - 3x^2 - 4x + 12$

21. $2 - 128x^3$

19. ________________ 20. ________________ 21. ________________

22. **Perform the indicated operations. Write the final answer in scientific notation.**

$\frac{0.0000132}{(3{,}300{,}000)(0.00002)}$

22. ________________

23. **The polynomial $h(t) = -16t^2 + 100t + 5$ gives the height in feet of a projectile t seconds after it has been launched. Find the height of the projectile after 2 seconds.**

23. ________________

24. **Write a polynomial $P(x)$ that expresses the area of a triangle whose base is 2 feet less than twice its height.**

24. ________________

Chapter P Test -- Form C **Name:** ________________________

Determine which elements of the set

$\{ -\pi, -2, -1.999\cdots, -\frac{2}{5}, 0, \frac{5}{3}, \frac{6}{3}, \sqrt{5} \}$

are members of the following sets.

1. Natural numbers: _______________ **2.** Rational numbers: _________________

Evaluate each expression:

3. $3^{-1} + 3^{-2}$ **4.** $4^{5/2}$ **5.** $3(2-3)^2 + |4-6|$ **6.** $\frac{3-2(4)}{2^2+3^2-3}$

3. ________ 4. ________ 5. ________ 6.________

Simplify each expression. Assume that all variables represent positive real numbers.

7. $\frac{(3a^3b^2)^3}{6(a^2b)^2}$ **8.** $\sqrt[3]{54x^6} - x\sqrt[3]{24} + x\sqrt[3]{16x^3}$ **9.** $\frac{\sqrt{2}-1}{\sqrt{2}+1}$ **10.** $\frac{(9x^4y^{-6})^{1/2}}{3(x^0y^9)^{-1/3}}$

7. ________ 8. ________ 9. ________ 10.________

Perform the indicated operations and write the answer in the form $a+bi$, where a and b are real.

11. $\frac{1}{2+3i}$ **12.** $\sqrt{-3}\left(\sqrt{-27}+\sqrt{3}\right)$

11. ______________________ 12. ______________________

Perform the indicated operations and simplify the results.

13. $(x^2 - 4x + 3) - (x^3 - x^2 + x + 2)$

13. ________________

14. $(a^2b - 3)(a + b)$

14. ________________

15. $(4x^3 - 11x - 10) \div (x - 2)$

15. ________________

16. $\dfrac{2}{x-1} - \dfrac{1}{x+1}$

16. ________________

17. $\dfrac{x^3+x^2}{x^2-x} \div \dfrac{x^3-x}{x^2+x-2}$

17. ________________

18. $\dfrac{\frac{y}{x} - \frac{1}{x^2}}{\frac{1}{x} - y}$

18. ________________

Factor completely:

19. $8x^2 - 2x - 15$

19. ________________

20. $8x^2 - 18y^4$

20. ________________

21. $x^3 + x^2 + x + 1$

21. ________________

22. $125x^3 + 64$

22. ________________

23. **Perform the indicated operations. Write the final answer in scientific notation.**

$\dfrac{12{,}200{,}000}{(6{,}100{,}000)(0.005)}$

23. ________________

24. **The polynomial $P(n) = -2n^2 + 255n - 2000$ gives the profit in dollars from the production of n items. Find the profit in producing 100 items.**

24. ________________

25. **Write a polynomial $P(x)$ that expresses the area of a rectangle whose width is 5 meters less than half its length.**

25. ________________

 Name: ________________________

Determine which elements of the set
$\{ -\frac{15}{2}, -\frac{10}{2}, -\pi, -1.2, 0, \sqrt{1}, 0.020202\cdots, 0.020020002\cdots, 6 \}$
are members of the following sets.

1. Irrational numbers:__________________ **2.** Integers: ____________________________

Evaluate each expression:

3. $\dfrac{5-2\,|3-2^2|}{2+8\div 4}$ **4.** $\dfrac{(2+3)^2}{2^2+3^2}$ **5.** $\dfrac{y-x}{xy+z^2}$ if $\begin{cases} x=-2 \\ y=5 \\ z=-5 \end{cases}$ **6.** $4^{3/2}\cdot 2^{-1}$

3. ________ 4. ________ 5. ________ 6.________

Simplify each expression. Assume that all variables represent positive real numbers.

7. $\dfrac{(-2x^{-1}y^3)^2}{(2x^{-1}y^2)^3}$ **8.** $\left(\dfrac{a^3b+2b^2}{b}\right)^2$ **9.** $\sqrt[4]{32x^5y^8}$ **10.** $\left(\sqrt{5}-\sqrt{2}\right)^2$

7. ________ 8. ________ 9. ________ 10.________

Perform the indicated operations and write the answer in the form $a+bi$, where a and b are real.

11. $\sqrt{-1}\left(\sqrt{-4}-1\right)$ **12.** $\dfrac{3-i}{2+i}$

11. ________________________ 12. ________________________

Perform the indicated operations and simplify the results.

13. $\left(3x^4-x^2+x\right)-\left(x^3-x^2+3x-2\right)$

13. _________________

14. $\left(\frac{3}{2}x+\frac{1}{2}\right)^2$

14. _________________

15. $\left(2x^3+x^2+1\right)\div(x+1)$

15. _________________

16. $\frac{2x}{x^2-1} - \frac{1}{x+1}$

16. ________________

17. $\frac{x^2+5x+6}{x^2+x-2} \cdot \frac{x^3-1}{x^2+x+1}$

17. ________________

18. $\frac{xy^{-1}-yx^{-1}}{x^{-1}-y^{-1}}$

18. ________________

Factor completely:

19. $6x^2+x-12$

19. ________________

20. $a^3b-3a+a^2b^2-3b$

20. ________________

21. $2x^4-12x^3+18x^2$

21. ________________

22. $16-36x^2$

22. ________________

23. **Perform the indicated operations using scientific notation. Give final answer in standard notation.**

$\frac{(0.0005)(480{,}000{,}000)}{(80{,}000)(0.000001)}$

23. ________________

24. **The polynomial $P(n) = -1.25n^2+80n$ gives the revenue in dollars from the sale of n items. Find the revenue on the sale of 50 items.**

24. ________________

25. **Write a polynomial $P(x)$ that expresses the area of a rectangle whose width is 2 inches more than one-third its length.**

25. ________________

Chapter P Test -- Form E **Name: ________________________**

A. True or False:

_____ 1. 0 is an irrational number.

_____ 2. All natural numbers are integers.

_____ 3. $|\,x - y\,| = \,|\,y - x\,|$

_____ 4. $\frac{3}{0}$ is an irrational number.

_____ 5. $(a+b)^3 = a^3 + b^3$

_____ 6. $-4^{-2} = 16$

_____ 7. Every positive real number is a rational number.

_____ 8. $0.00235 \times 10^{-2} = 2.35 \times 10^{-5}$

_____ 9. $\left(\frac{a^{-2}}{b^{-3}}\right)^{-4} = \frac{b^7}{a^6}$

_____ 10. For all real numbers x: $|\,-x\,| = x$.

B. Multiple Choice: Choose the best answer.

_____ **11.** **Evaluate:** $\left(2^{-1}+3^{-1}\right)^{-1}$.

a. 5 b. $-\frac{1}{5}$ c. $\frac{5}{6}$ d. $\frac{6}{5}$

_____ **12.** **Evaluate:** $\frac{2(-2)^2-3}{-2-3}$.

a. -1 b. $\frac{11}{5}$ c. -5 d. 5

_____ **13.** **Rationalize the denominator and simplify:** $\frac{\sqrt{5}-1}{\sqrt{5}+1}$.

a. $\frac{3-\sqrt{5}}{2}$ b. $\frac{5-\sqrt{5}}{6}$ c. $\frac{4}{7+2\sqrt{5}}$ d. $\frac{6-\sqrt{5}}{2}$

_____ **14.** **Simplify:** $-(-32)^{-3/5}$.

a. 64 b. $\frac{1}{8}$ c. 8 d. $-\frac{1}{8}$

_____ **15.** **Simplify:** $\frac{6a^{-2}b^3c^{-2}}{12a^4b\,c^{-1}}$.

a. $\frac{b^2}{2a^6c}$ b. $\frac{1}{2}\,a^2b^2c$ c. $\frac{b^2c}{2a^6}$ d. $\frac{1}{2a^6b^2c}$

_____ **16.** **Simplify:** $\left(5x^2+6x-6\right)-\left(-x^3+5x^2-7x-6\right)$.

a. x^3+13x c. $x^3+13x-12$

b. $-x^3+10x^2-x$ d. x^3+10x^2-x-12

_____ **17.** **Expand the product:** $\left(\frac{1}{3}x+\frac{2}{5}\right)^2$.

a. $25x^2+60x+36$ c. $\frac{1}{9}x^2+\frac{4}{25}$

b. $\frac{1}{6}x^2+\frac{4}{15}x+\frac{4}{25}$ d. $\frac{1}{9}x^2+\frac{4}{15}x+\frac{4}{25}$

_____ **18.** **Simplify:** $\frac{5x+8}{x+5}-\frac{3x-2}{x+5}$.

a. $2x+102x+10$ c. 2

b. $\frac{2x+6}{x+5}$ d. $\frac{2x+10}{x+5}$

_____ **19.** **Simplify:** $\frac{6x+24}{x^2-4x+3} \div \frac{3x+12}{x-1}$.

a. $\frac{2}{x-3}$ b. $\frac{2(x-1)}{3x(x-2)}$ c. $\frac{6}{3x-9}$ d. $\frac{18(x+4)^2}{(x-3)(x-1)^2}$

_____ **20.** **Simplify:** $\frac{x^{-1}+2}{x+2x^2}$.

a. $\frac{1}{x^5}$ b. $\frac{1}{x^2}$ c. $\frac{2}{x^2+2x^3}$ d. $\frac{x+2}{x(x+2x^2)}$

_____ **21.** **Factor completely:** $x^5 - x$.

a. $x(x^4)$ c. $x(x-1)(x+1)(x^2+1)$
b. $x(x^2+1)(x-1)^2$ d. $x(x^4-1)$

_____ **22.** **Factor completely:** $4x^3 + 12x^2 + x + 3$.

a. $(2x+1)^2(x+3)$ c. $4x^2(x+3)$
b. $(4x^2+1)(x+3)$ d. $(x+3)^2(4x^2+1)$

_____ **23.** **Factor completely:** $x^2 + 30xy + 225y^2$.

a. $(x+15y)^2$ b. $(x+225y)^2$ c. $x^2+(15y)^2$ d. $x^2+15y(2x+15y)$

_____ **24.** **Simplify:** $\sqrt{72x^5y^7}$.

a. $x^2y^3\sqrt{72xy}$ b. $9xy\sqrt{8x^3y^5}$ c. $3x^2y^3\sqrt{8xy}$ d. $6x^2y^3\sqrt{2xy}$

_____ **25.** **Simplify:** $\sqrt{27} + \sqrt{12} - \sqrt{20}$.

a. $\sqrt{19}$ b. $5 - 2\sqrt{5}$ c. $3\sqrt{5}$ d. $5\sqrt{3} - 2\sqrt{5}$

_____ **26.** **The altitude of a falling rock t seconds after it is dropped is calculated from the polynomial $h(t) = -16t^2 + 200$. Find the altitude of the rock 2 seconds after it is dropped.**

a. 78 feet b. 136 feet c. 264 feet d. 164 feet

_____ **27.** **Find the equivalent expression for:** $\frac{22{,}000(2{,}000{,}000)}{0.00004}$.

a. 1.1×10^{16} b. 1.1×10^{5} c. 1.1×10^{13} d. 1.1×10^{15}

_____ **28.** **A rectangle has a length which is 3 more than its width. Write a polynomial $P(x)$ which expresses the perimeter of this rectangle in terms of the width x.**

a. $P(x) = x^2 + 3x$ b. $P(x) = 4x + 3$ c. $P(x) = 4x + 6$ d. $P(x) = 2x + 3$

_____ **29.** **Perform the indicated operations and simplify:** $\left(\sqrt{-3}+4\right)\left(\sqrt{-3}-1\right)$.

a. $-7 + 3i\sqrt{3}$ b. $5 + 3i\sqrt{3}$ c. $-1 + 3\sqrt{-3}$ d. $-1 + 5i\sqrt{3}$

_____ **30.** **Perform the indicated operation and simplify:** $\frac{1+3i}{1-2i}$.

a. $1 - \frac{3}{2}i$ b. $-1 + i$ c. $7 + i$ d. $\frac{7}{5} + \frac{1}{5}i$

 Name: ________________________

A. True or False:

_____ 1. $\sqrt{2}$ is a real number.

_____ 2. All integers are natural numbers.

_____ 3. $\frac{-x+y}{y-x} = -1.$

_____ 4. $\pi = 3.14$

_____ 5. $\left(x^{0.5} + y^{0.5}\right)^2 = x + y$

_____ 6. $\left(\frac{a}{b}\right)^{-2} = \frac{b^2}{a^2}$

_____ 7. Every positive real number is a rational number.

_____ 8. $0.000235 \times 10^{-2} = 2.35 \times 10^{-4}$

_____ 9. $(a+b)^2 = a^2 + b^2$

_____ 10. For all real numbers x: $\sqrt{x^2} = x$.

B. Multiple Choice. Choose the best answer:

_____ **11.** **Evaluate: $5^2 - 2^2$.**

a. 21 b. 9 c. 29 d. 6

_____ **12.** **Evaluate: $\frac{3(-2)^2 - (-3)}{2-3}$.**

a. -2 b. 9 c. -15 d. -10

_____ **13.** **Rationalize the denominator and simplify: $\frac{\sqrt{2}-3}{\sqrt{2}+3}$.**

a. $-\frac{1}{5}$ b. $\frac{6\sqrt{2}-11}{5}$ c. $11 - 6\sqrt{2}$ d. $\frac{6\sqrt{2}-11}{7}$

_____ **14.** **Simplify: $(-8)^{-4/6}$.**

a. $\sqrt[6]{(8)^4}$ b. $-\sqrt[6]{(8)^{-4}}$ c. $\frac{1}{4}$ d. 4

_____ **15.** **Simplify: $\frac{12a^2b^3c^2}{2a^4bc^{-1}}$.**

a. $\frac{6b^2}{a^6c}$ b. $6a^2b^2c$ c. $\frac{6}{a^6b^2c}$ d. $\frac{6b^2c^3}{a^2}$

_____ **16.** **Simplify: $\left(5x^2 + 4x - 3\right) + \left(-9x^2 + 2x + 1\right) - \left(3x^2 - 8x + 7\right)$.**

a. $-7x^2 + 14x - 9$ c. $-x^2 - 2x + 5$

b. $11x^2 - 2x + 5$ d. $-7x^2 - 2x + 5$

_____ **17.** **Expand and simplify: $(2x+7)(5x-3) - 6x(x-2)$.**

a. $4x^2 + 29x + 12$ c. $4x^2 + 17x - 21$

b. $10x^2 + 35x - 33$ d. $4x^2 + 41x - 21$

_____ **18.** **Simplify: $\frac{x}{x^2-1} - \frac{1}{x-1}$.**

a. $\frac{x-1}{x^2-x-1}$ b. $\frac{1}{x^2-1}$ c. $-\frac{1}{x^2-1}$ d. $\frac{x-1}{x^2-x}$

_____ **19.** **Simplify:** $\frac{3x-9y}{9y^2-x^2}$.

a. $\frac{-1}{y+x}$ b. $\frac{-3}{3y+x}$ c. $\frac{1}{y+x}$ d. $\frac{3(x-3y)}{(3y+x)(3y-x)}$

_____ **20.** **Simplify:** $\frac{\frac{x-y}{xy}}{\frac{y-x}{x}}$.

a. $\frac{x-y}{y^2-xy}$ b. $-\frac{1}{y}$ c. $-y$ d. $-\frac{(x-y)^2}{x^2y}$

_____ **21.** **Factor completely:** x^4-y^4.

a. $(x-y)^4$
b. $(x^2-y^2)(x^2+y^2)$
c. $(x-y)(x+y)^3$
d. $(x-y)(x+y)(x^2+y^2)$

_____ **22.** **Factor completely:** $x^3y^2+x^3-3y^2-3$.

a. $\left(x^3+1\right)^2\left(y^2-3\right)$
b. $\left(x^3-3\right)\left(y^2+1\right)$
c. $\left(x^3-3\right)\left(y^2\right)$
d. $\left(x^3+3\right)(y+1)(y-1)$

_____ **23.** **Factor completely:** $14z^2-3zk-2k^2$.

a. $(2z+7k)(k-2z)$
b. $(7z+2k)(2z-k)$
c. $(7k+2z)(2k-z)$
d. Prime, not factorable

_____ **24.** **Simplify:** $(\sqrt{7}+\sqrt{2})(\sqrt{7}-3\sqrt{2})$.

a. $5-2\sqrt{14}$ b. $5-4\sqrt{7}$ c. $9-2\sqrt{14}$ d. $1-2\sqrt{14}$

_____ **25.** **Simplify:** $\frac{\sqrt{112xy^2}}{\sqrt{7xy}}$.

a. $\sqrt{16y}$ b. $16y$ c. $4\sqrt{y}$ d. $\frac{y\sqrt{784}}{7}$

_____ **26.** **Find the equivalent expression for:** $\frac{3.2\times10^{-4}}{0.00004(1{,}600{,}000{,}000)}$.

a. 5×10^{8} b. 0.5 c. 5×10^{-9} d. 5×10^{-8}

_____ **27.** **A triangle has a base which is 3 more than its height. Write a polynomial $P(x)$ which expresses the area of this triangle.**

a. $P(x)=2x+3$
b. $P(x)=\frac{x^2+3x}{2}$
c. $P(x)=4x+6$
d. $P(x)=x^2+3x$

_____ **28.** **Evaluate the expression b^2-4ac for the values $a=-2, b=-3, c=-4$.**

a. -23 b. -41 c. -26 d. 41

_____ **29.** **Perform the indicated operation and simplify:** $\frac{2-i}{3+4i}$.

a. $\frac{2}{3}-\frac{1}{4}i$ b. $\frac{2}{5}-\frac{11}{5}i$ c. $2-i$ d. $\frac{2}{25}-\frac{11}{25}i$

_____ **30.** **Perform the indicated operation and simplify:** $i\left(3i^2+4i\right)$.

a. $3+4i$ b. $-3-4i$ c. $-4-3i$ d. $-4+3i$

Chapter 1 Test -- Form A **Name:**___________________________

Find all real or imaginary solutions to each equation.

1. $\frac{2}{3}(x-6) = \frac{x-7}{9}$

2. $x^2 + 4 = 0$

1. ________________________

2. ________________________

3. $\frac{5}{x+2} + 1 = \frac{4}{x+2}$

4. $3x^2 + 3 = 10x$

3. ________________________

4. ________________________

Solve each inequality in one variable. State the solution set using interval notation and graph it on the number line.

5. $4 - 3x \leq 10$

6. $3|2x+1| > 3$

5. ________________________

6. ________________________

Sketch the graph of each equation in the *xy*-coordinate system.

7. $2x - 5y = 10$

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

Solve each problem.

9. Find the slope of the line that goes through (2, 5) and (−1, 2).

9. ________________________

10. Find the slope-intercept form of the equation of the line that goes through $(3, -1)$ and is perpendicular to the line $y = 2x - 4$.

10. ____________________

11. Find the exact distance between $(-3, 4)$ and $(2, 1)$.

11. ____________________

12. How many liters of water must be added to 30 liters of a 20% alcohol solution to dilute it to a 15% solution?

12. ____________________

13. A rectangle has two sides of length 5 inches and a diagonal which is one inch longer than the length of the other two sides. Find the length of the diagonal.

13. ____________________

14. Solve $\frac{1}{x} + 2 = \frac{c}{2}$ for x.

14. ____________________

15. Find the value of the discriminant for $x^2 + 6x + 9 = 0$. How many real solutions are there for this equation?

15. ____________________

16. The following table shows weights related to heights.

height (in.)	54	60	63	66	69
weight (lb.)	65	78	95	112	120

Use the linear regression feature on your calculator to find the regression equation, and then use that equation to predict the weight related to a height of 59 inches.

16. ____________________

Chapter 1 Test -- Form B **Name:**______________________

Find all real or imaginary solutions to each equation.

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

2. $2x^2 + 8 = 0$

1. ____________________

2. ____________________

3. $2x^2 = 32$

4. $6x^2 - 6 = 5x$

3. ____________________

4. ____________________

Solve each inequality. State the solution set using interval notation and graph it.

5. $1 - 4x < 5$

6. $|5 - x| < 2$

5. ____________________

6. ____________________

Sketch the graph of each equation.

7. $3x - 4y = 12$

8. $x^2 + y^2 = 6y$

Solve each problem.

9. Find the slope of the line that goes through (3, 1) and (4, −2).

9. ____________________

10. Find the slope-intercept form of the equation of the line that goes through (4, −2) and is perpendicular to the line $y = \frac{1}{2}x - 4$.

10. ____________________

11. Find the exact distance between $(-2,\ 5)$ and $(4,\ 12)$.

11. ____________________

12. How much water must be added to 20 quarts of a 12% alcohol solution to dilute it to a 9% solution?

12. ____________________

13. A rectangle has a length which is one unit longer than its width. If each side of the rectangle is increased by one unit, then the area is increased by 10 square units. What were the original dimensions of the rectangle?

13. ____________________

14. Solve $x = \frac{1}{y} + 2$ for y.

14. ____________________

15. Find the value of the discriminant for $2x^2 + 6x + 9 = 0$. How many real solutions are there for this equation?

15. ____________________

16. The following table shows weights related to heights.

height (in.)	54	60	63	66	69
weight (lb.)	65	78	95	112	120

Use the linear regression feature on your calculator to find the regression equation, and then use that equation to predict the weight related to a height of 72 inches.

16. ____________________

Chapter 1 Test -- Form C **Name:**_________________________

Find all real or imaginary solutions to each equation.

1. $\frac{1}{2}(x+3) = \frac{2}{5}x + 1$

2. $|x+2| = 5$

1. ______________________

2. ______________________

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

4. $6x^2 - 7x = 3$

3. ______________________

4. ______________________

Solve each inequality. State the solution set using interval notation and graph it.

5. $3 - \frac{2}{3}x \geq -1$

6. $|2x-1| - 2 > 3$

5. ______________________

6. ______________________

Sketch the graph of each equation.

7. $2x = 5 - y$

8. $(x+2)^2 + y^2 = 8y$

Solve each problem.

9. Find the slope of the line that goes through $(-2, -1)$ and $(3, 1)$.

9. ______________________

10. Find the slope-intercept form of the equation of the line that goes through $(-5, 2)$ and is perpendicular to the line $y = -\frac{1}{3}x - \frac{2}{3}$.

10. ______________________

11. Find the exact distance between $(4, \frac{1}{2})$ and $(-6, \frac{3}{2})$.

11. ______________________

12. How many liters of a 40% acid solution must be mixed with 10 liters of a 10% acid solution in order to end up with a 20% acid solution?

12. ______________________

13. A pair of jeans costs \$23.54 after taxes. If the price tag on the jeans reads \$22.00, what is the tax rate?

13. ______________________

14. Solve $3(b - a) + 5 = \frac{b+a}{2}$ for b.

14. ______________________

15. Find the value of the discriminant for $5x^2 + 9 = 0$. How many real solutions are there for this equation?

15. ______________________

16. The following table shows the waist size (in inches) of men of a certain age (in years).

age	25	30	35	40	45
waist size	32	35	36.5	40.5	44

Use the linear regression feature on your calculator to find the regression equation, and then use that equation to predict the waist size of a 32-year old man.

16. ______________________

Name: ________________________

Find all real and imaginary solutions to each equation.

1. $2 + 5x = 2x$

2. $|3x + 4| + 2 = 5$

1. ____________________

2. ____________________

3. $x^2 + 7x + 9 = 0$

4. $3\left(x^2 - 4\right) = 6$

3. ____________________

4. ____________________

Solve each inequality. State the solution set using interval notation and graph it.

5. $\frac{1}{4}x + \frac{2}{3} \geq \frac{1}{2}$

6. $3 - |x + 3| > 1$

5. ____________________

6. ____________________

Sketch the graph of each equation.

7. $2x = 4y - 6$

8. $x^2 + (y + 1)^2 = 4x$

Solve each problem.

9. Find the slope of the line that goes through (2, 1) and $(-3, -1)$.

9. ____________________

10. Find the slope-intercept form of the equation of the line that goes through $(2, -3)$ and is perpendicular to the line $y = -\frac{5}{2}x - \frac{1}{4}$.

10. ______________________

11. Find the exact distance between $(3, -2)$ and $(-3, 5)$.

11. ______________________

12. Solve $\frac{y+5}{x-4} = \frac{3}{2}$ for x.

12. ______________________

13. Find the midpoint of the line segment with endpoints $(-2, 3)$ and $(5, -1)$.

13. ______________________

14. Find the x- and y-intercepts for the graph of $20x - 35y = 70$.

14. ______________________

15. A pair of jeans costs $35.26 after taxes. If the tax rate is 8.5%, what was the price of the jeans before taxes?

15. ______________________

16. The following table shows the waist size (in inches) of men of a certain age (in years).

age	25	30	35	40	45
waist size	32	35	36.5	40.5	44

Use the quadratic regression feature on your calculator to find the regression equation. Use that equation to predict the waist size of a 50-year old man.

16. ______________________

Name: ________________________

Multiple Choice: Choose the best answer for each of the following.

_____ **1.** **Solve for x:** $\frac{2}{3}x + \frac{1}{2} = \frac{1}{2}x + \frac{1}{3}$.

a. -1 b. $\frac{5}{6}$ c. 5 d. $\frac{1}{5}$

_____ **2.** **Write the slope-intercept form of the equation of the line through $(-1, 2)$ that is perpendicular to the line $x + 3y = 4$.**

a. $y = 3x + \frac{4}{3}$ b. $y = 3x + 5$ c. $y = -\frac{1}{3}x + \frac{5}{3}$ d. $y = -\frac{1}{3}x - \frac{7}{3}$

_____ **3.** **Solve for y:** $\frac{y-2}{x-3} = -2$.

a. $-2x + 8$ b. 2 c. 8 d. $-2x - 1$

_____ **4.** **The cost of a television set after taxes is \$436. What is the cost of the TV before taxes if the tax rate is 9% ?**

a. \$427 b. \$363.16 c. \$400 d. \$518.84

_____ **5.** **On a lonely stretch of highway in West Texas, Jacob sets his truck on cruise and travels to his work site, a trip which takes 5 hours. At the end of the week, on the trip home, he travels the same distance, but his cruise control is set at a speed which is 15 mph faster since he is very anxious to get home. Thus, he arrives in just 4 hours. What is his speed on the trip home?**

a. 75 mph b. 60 mph c. 90 mph d. 70 mph

_____ **6.** **Solve for x:** $2x^2 - 6 = 0$.

a. $\pm\sqrt{3}$ b. 3 c. $\pm\frac{\sqrt{6}}{2}$ d. $\pm\frac{3}{2}$

_____ **7.** **Solve for y:** $6y^2 - 5y = 6$.

a. $\frac{3}{2}, -\frac{2}{3}$ b. $1,\ 11$ c. $\frac{5 \pm \sqrt{169}}{12}$ d. $\frac{5 \pm i\sqrt{119}}{12}$

_____ **8.** **Solve for x:** $x^2 = 4x$.

a. 4 b. $\pm 2\sqrt{x}$ c. ± 2 d. $0, 4$

_____ **9.** **Solve the inequality:** $2x-3>5$ **and** $5x+2\le 32$.

a. $(4, 6]$ b. $(4, \infty) \cup (-\infty, 6]$ c. $(-\infty, 6]$ d. $(-\infty, \infty)$

_____ **10.** **To receive a C in a math course, an average between 70 and 80, inclusive, is required. Leah has scores of 76, 82, and 87 on her first three math tests. After the fourth test, she states that she now has a C average. What is the range of scores possible for her fourth test in order for that statement to be true?**

a. [0, 70] b. [70, 80] c. [35, 75] d. [60, 70]

_____ **11.** **Find the slope of the line passing through the points** $(-3, -4)$ **and** $(6, -9)$.

a. $-\frac{9}{5}$ b. $-\frac{5}{9}$ c. $-\frac{3}{13}$ d. $-\frac{13}{3}$

_____ **12.** **Find the midpoint of the line segment with endpoints** $(-3, -4)$ **and** $(6, -9)$.

a. $(-4.5, 2.5)$ b. $-\frac{5}{9}$ c. $(1.5, -6.5)$ d. $(0, -6)$

_____ **13.** **Solve the inequality:** $5-3x>14$.

a. $(-\infty, -3) \cup (\frac{19}{3}, \infty)$ b. $(-3, \infty)$ c. $(-\infty, -\frac{11}{3})$ d. $(-\infty, -3)$

_____ **14.** **Solve for** x**:** $|x-1|=3$.

a. $\{4\}$ b. $\{-4\}$ c. $\{-4, 4\}$ d. $\{-2, 4\}$

_____ **15.** **Find all solutions:** $x^2+2x-3=0$.

a. $\{-1, 3\}$ b. $\{-3, 1\}$ c. $\{0, -1 \pm \sqrt{2}\}$ d. $\{-1 \pm \sqrt{2}\}$

_____ **16.** **The following table shows weights related to heights.**

height (in.)	**54**	**60**	**63**	**66**	**69**
weight (lb.)	**65**	**78**	**95**	**112**	**120**

Use the linear regression feature on your calculator to find the regression equation which gives the weight (y) in relation to the height (x).

a. $y=x+9$
b. $y=13x+54$
c. $y=0.25x+39$
d. $y=3.9x-149$

Chapter 1 Test -- Form F Name: ________________________

Multiple Choice: Choose the best answer for each of the following.

_____ **1.** **Solve for x:** $\frac{2}{5}x + \frac{1}{3} = \frac{1}{2}x + \frac{1}{3}$.

a. -1 b. $-\frac{20}{3}$ c. 0 d. $\frac{20}{3}$

_____ **2.** **Write the slope-intercept form of the equation of the line that goes through $(-2, 3)$ and is perpendicular to the line $x + 3y = 4$.**

a. $y = 3x - 3$ b. $y = 3x + \frac{4}{3}$ c. $y = 3x + 9$ d. $y = -\frac{1}{3}x + \frac{7}{3}$

_____ **3.** **Solve for y:** $\frac{y-3}{x-2} = -2$.

a. $\frac{2}{3}x + \frac{7}{3}$ b. 3 c. $-2x + 7$ d. $-2x - 1$

_____ **4.** **The cost of a television set after taxes is \$324. What is the cost of the TV before taxes if the tax rate is 8% ?**

a. \$349.92 b. \$300.00 c. \$298.08 d. \$264.00

_____ **5.** **The Walker family will all be attending a wedding out-of-town. Bettye and Harold Walker leave a day early and arrive in the town where the wedding will take place in 3.5 hours. Mary and Janie Walker leave the morning of the wedding, drive an average of 10 miles per hour faster than their siblings did the day before, and arrive in 3 hours. How far away was the town from the Walker residence?**

a. 165 miles b. 180 miles c. 60 miles d. 210 miles

_____ **6.** **Solve for x:** $2x^2 - 10 = 0$.

a. $\pm\sqrt{5}$ b. 5 c. $\pm\frac{\sqrt{10}}{2}$ d. $\pm\frac{\sqrt{5}}{2}$

_____ **7.** **Solve for y:** $6y^2 + y = 12$.

a. $12, \frac{11}{6}$ b. $\frac{-1 \pm \sqrt{289}}{12}$ c. $\frac{-1 \pm \sqrt{287}}{12}$ d. $-\frac{3}{2}, \frac{4}{3}$

_____ **8.** **Solve for x:** $x^2 = 9x$.

a. $0, 9$ b. $\pm 3\sqrt{x}$ c. ± 3 d. 9

_____ **9.** **Solve the inequality:** $3-2x>5$ **and** $5x+2\geq -28$.

a. $(-1,\infty)$ b. $[-6,-1)$ c. $(-1,6]$ d. $(-\infty,-1)\cup(-6,\infty)$

_____ **10.** **To receive a B in a math course, an average between 80 and 89, inclusive, is required. Leah has scores of 76, 82, and 98 on her first three math tests. After the fourth test, she states that she now has a B average. What is the range of scores possible for her fourth test in order for that statement to be true?**

a. $[80, 89]$ b. $[64, 100]$ c. $[13.5, 23]$ d. $[75, 95]$

_____ **11.** **Find the slope of the line passing through the points** $(1,1)$ **and** $\left(\frac{2}{5},0\right)$.

a. $\frac{1}{3}$ b. $-\frac{3}{5}$ c. $\frac{5}{3}$ d. $-\frac{5}{3}$

_____ **12.** **Find the slope of the line which is parallel to the line** $x=\frac{4}{5}y+\frac{1}{4}$.

a. $\frac{4}{5}$ b. $\frac{5}{4}$ c. $-\frac{5}{4}$ d. $-\frac{5}{16}$

_____ **13.** **Solve the inequality:** $5<1-3x\leq 10$.

a. $\left(\frac{4}{3},3\right]$ b. $\left[-\frac{11}{3},-\frac{4}{3}\right)$ c. $\left[-3,-\frac{4}{3}\right)$ d. $\left(-\infty,-\frac{4}{3}\right)\cup\left[-3,\infty\right)$

_____ **14.** **Solve for** x: $|3x-6|=9$.

a. $\{-1\}$ b. $\{5\}$ c. $\{1,5\}$ d. $\{-1,5\}$

_____ **15.** **Find all solutions:** $x^2-2x-3=0$.

a. $\{-1,3\}$ b. $\{-3,1\}$ c. $\{0,-1\pm\sqrt{2}\}$ d. $\{-1\pm\sqrt{2}\}$

_____ **16.** **The following table shows weights related to heights.**

height (in.)	**54**	**60**	**63**	**66**	**69**
weight (lb.)	**65**	**78**	**95**	**112**	**120**

Use the linear regression feature on your calculator to find the regression equation which gives the weight (y) in relation to the height (x).

a. $y=x+9$
b. $y=13x+54$
c. $y=0.25x+39$
d. $y=3.9x-149$

 Name: ______________________

Determine whether each equation defines y as a function of x.

1. $x - 3y = 2$

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

1. __________

2. __________

State the domain and range of each relation.

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

4. $x = \sqrt{y+1}$

3. *domain:* __________
range: __________

4. *domain:* __________
range: __________

Sketch the graph of each function.

5. $x + 2y = 4$

6. $y = \sqrt{x-1}$

7. $y = -(x-1)^2 - 2$

8. $f(x) = \begin{cases} x+1, & for\ x < 2 \\ 2-x, & for\ x \geq 2 \end{cases}$

Let $f(x) = x^2 + x$ and $g(x) = 2x + 1$. Find and simplify each of the following expressions.

9. $f(4)$

10. $g^{-1}(x)$

11. $(f \circ g)(2)$

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

9. __________

10. __________

11. __________

12. __________

Solve each problem.

13. State the intervals on which $f(x) = (x+3)^2 - 1$ is increasing.

13. ______________________________

14. Discuss the symmetry of the graph of the function $f(x) = x^3 - x$.

14. ______________________________

15. State the solution set to the inequality $(x-1)^2 > 1$ using interval notation.

15. ______________________________

16. Pete's Print Shop charges \$60 for printing 300 business cards and \$80 for printing 500 business cards. What is the average rate of change of the cost of printing as the number of cards goes from 300 to 500?

16. ______________________________

17. The area of a rectangle is 30 square feet. Write the perimeter of this rectangle as a function of the length of one of its sides, x.

17. ______________________________

18. The grade on Walker's math test varies directly with the number of hours he spends studying for the test. If he studies only 2 hours, he makes a 62. What will his score be if he studies for 3 hours?

18. ______________________________

 Name: ______________________

Determine whether each equation defines y as a function of x.

1. $2x - 4y = 3$

2. $x = |\, y \,|$

1. __________

2. __________

State the domain and range of each relation.

3. $y = |\, 2x \,| + 1$

4. $x = y^2 - 1$

3. *domain:* __________
range: __________

4. *domain:* __________
range: __________

Sketch the graph of each function.

5. $3x - y = 3$

6. $y = \sqrt{x} + 2$

7. $f(x) = \begin{cases} 1 - x, & for\ x < 1 \\ 2x + 1, & for\ x \geq 1 \end{cases}$

8. $y = (x + 2)^2 + 1$

Let $f(x) = \sqrt{x + 5}$ and $g(x) = 5x + 1$. Find and simplify each of the following.

9. $f(4)$

10. $g^{-1}(x)$

11. $(f \circ g)(2)$

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

9. __________

10. __________

11. __________

12. __________

Solve each problem.

13. State the intervals on which $f(x) = (x-1)^2 + 2$ is increasing.

13. ______________________

14. Discuss the symmetry of the graph of the function $f(x) = x^3 - x^2$.

14. ______________________

15. State the solution set to the inequality $(x+1)^2 < 1$ using interval notation.

15. ______________________

16. Pete's Print Shop charges $50 for printing 500 business cards and $90 for printing 1000 business cards. What is the average rate of change of the cost of printing as the number of cards goes from 500 to 1000?

16. ______________________

17. The perimeter of a rectangle is 10 square feet. Write the area of this rectangle as a function of the length of one of its sides, x.

17. ______________________

18. The grade on Walker's math test varies directly with the number of hours he spends studying for the test. If he studies only 2 hours, he makes a 50. What will his score be if he studies for 3 hours?

18. ______________________

Chapter 2 Test -- Form C **Name:**________________________

Determine whether each relation defines y as a function of x.

1. $\{(3,1),\ (2,4),\ (3,2)\}$

2. $x^2 + y^2 = 1$

1. ___________

2. ___________

State the domain and range of each relation.

3. $y = (x-1)^2 + 2$

4. $f(x) = \begin{cases} -2x-3, & for\ x < 0 \\ x+1, & for\ x > 0 \end{cases}$

3. *domain:* ____________
range: ______________

4. *domain:* ____________
range: ______________

Sketch the graph of each function.

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

6. $y = (x+2)^2 - 1$

7. $y = |\,x\,| - 3$

8. $y = \sqrt{16 - x^2}$

Let $f(x) = 2x^2 - x + 1$ and $g(x) = \sqrt{5-x}$. Find and simplify each of the following.

9. $g(-19)$

10. $g^{-1}(x)$

11. $(f \circ g)(4)$

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

9. __________ 10. __________ 11. __________ 12. ________________

Solve each problem.

13. State the intervals on which $f(x) = |\, x - 2\,| + 3$ is increasing.

13. ______________________

14. Let $f(x) = x - 2$, $g(x) = x^2$ and $h(x) = x - 1$. Write $m(x) = x^2 - 2x + 1$ as a composition of appropriate functions chosen from f, g, and h.

14. ______________________

15. State the solution set to the inequality $(x + 1)^2 < 1$ using interval notation.

15. ______________________

16. Jane's Advertising charges \$500 for 1200 flyers and \$780 for 1600 flyers. What is the average rate ofchange of the cost of the advertising as the number of flyers goes from 1200 to 1600?

16. ______________________

17. Write the area of a square as a function of the length of one of its diagonals, d.

17. ______________________

18. The cost of constructing a 5-foot by 7-foot deck is \$192.50. If the cost varies jointly as the length and width, then what does an 8-foot by 10-foot deck cost?

18. ______________________

Chapter 2 Test -- Form D **Name:**___________________________

Determine whether each relation defines y as a function of x.

1. $\{(3,2),\ (2,3),\ (1,3)\}$

2. $x^2 + y = 5$

1. ____________

2. ____________

State the domain and range of each relation.

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

4. $g\,(x) = \begin{cases} x - 1, & for\ x > 3 \\ 2x - 7, & for\ x \leq 3 \end{cases}$

3. *domain:* _____________
*range:*_______________

4. *domain:*_____________
*range:*_______________

Sketch the graph of each function.

5. $y = -\frac{1}{3}x$

6. $y = -(x-3)^2 + 1$

7. $y = x^2 + 3$

8. $y = \sqrt{25 - x^2}$

Let $f(x) = x^2 + x$ and $g(x) = 2x + 1$. Find and simplify each of the following.

9. $(f+g)(2)$ **10.** $g^{-1}(x)$ **11.** $(f \circ g)(-1)$ **12.** $\frac{f(x+h) - f(x)}{h}$

9. ___________ 10. ___________ 11. ___________ 12. _________________

Solve each problem.

13. State the intervals on which $f(x) = 2 - x^2$ is increasing.

13. ______________________

14. Let $f(x) = (x-3)^{-1/2}$, $g(x) = 2x + 3$ and $h(x) = \sqrt{2x}$. Write $m(x) = \frac{1}{\sqrt{2x}}$ as a composition of appropriate functions chosen from f, g, and h.

14. ______________________

15. State the solution set to the inequality $(x+4)^2 < 1$ using interval notation.

15. ______________________

16. Jane's Advertising charges \$500 for 1200 flyers and \$820 for 1600 flyers. What is the average rate of change of the cost of the advertising as the number of flyers goes from 1200 to 1600?

16. ______________________

17. Write the area of a square as a function of the length of one of its diagonals, d.

17. ______________________

18. The cost of constructing a 5-foot by 7-foot deck is \$148.75. If the cost varies jointly as the length and width, then what does an 8-foot by 10-foot deck cost?

18. ______________________

 Name:________________________

Multiple Choice: Choose the best answer for each of the following.

_____ **1.** **Which of the following define y as a function of x?**

A. $y = |x - 2| + 1$ **C.** $x = 2$ **E.** $x = |y|$
B. $4x - 2y = 3$ **D.** $x^2 + y^2 = 4$ **F.** $x^3 + y = 2$

a. A, B, E b. A, C, E c. B, D, F d. A, B, F

_____ **2.** **What is the domain of the relation: $y = \sqrt{x+1}$?**

a. $[-1, \infty)$ b. $[0, \infty)$ c. $[1, \infty)$ d. $(-\infty, \infty)$

_____ **3.** **Find x, if $f(x) = \sqrt{x-3}$ and $f(x) = 3$.**

a. 0 b. 12 c. undefined d. 6

_____ **4.** **Determine the range of $f(x) = \begin{cases} x+1, & for\ x \geq 0 \\ -x+2, & for\ x < 0 \end{cases}$.**

a. $[1, \infty)$ b. $(-\infty, \infty)$ c. $(-\infty, 0) \cup (0, \infty)$ d. $[1, 2)$

_____ **5.** **Explain how to use the graph of $y = x^2$ to get the graph of $y = (x+2)^2$.**

a. Translate 2 units left c. Translate 2 units right
b. Translate 2 units down d. Translate 2 units up

_____ **6.** **Solve the inequality $|x - 1| - 2 \leq 0$ by using its graph.**

a. $(-\infty, 3]$ b. $[-1, 3]$ c. $(-\infty, -1] \cup [3, \infty)$ d. $[3, \infty)$

_____ **7.** **Find the domain of $f + g$ if $f = \{(-1, 0), (-2, 4), (3, 6)\}$ and $g = \{(-1, 0), (0, 5), (3, 2)\}$.**

a. $\{-1, 3\}$ b. $\{-1, -2, 0, 3\}$ c. $\{-1, 0, 3\}$ d. $\{-1, -2, 3\}$

_____ **8.** **If $f(x) = x^2 - 1$ and $g(x) = x + 1$, find $\left(\frac{f}{g}\right)(-1)$.**

a. 0 b. -2 c. $-x-1$ d. undefined

_____ **9.** **The area of a rectangle is 20 square feet. Write the perimeter of this rectangle as a function of the length of *one* of its sides, x.**

a. $P = 2x + 2\left(\frac{20}{x}\right)$ c. $P = 2x + 2y - 20$
b. $P = 2x + 2(10 - x)$ d. $P = 2x + 2y$

_____ **10.** **Use f^{-1} to find the range of $f(x) = \frac{2x-1}{x+3}$.**

a. $(-\infty, -3) \cup (-3, \infty)$
b. $(-\infty, 0) \cup (0, \infty)$
c. $(-\infty, 2) \cup (2, \infty)$
d. $(-\infty, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$

_____ **11.** **Express the radius of a circle, r, as a function of its circumference C, given $C = \pi d$, where d is the diameter of the circle.**

a. $r = \frac{C}{2\pi}$
b. $C = \pi r^2$
c. $r = \sqrt{\frac{C}{\pi}}$
d. $r = \frac{C}{\pi}$

_____ **12.** **Find the constant of variation for the following: c varies inversely as the square of t and $c = 4$ when $t = 5$.**

a. 20
b. 100
c. $\frac{5}{4}$
d. $\frac{25}{4}$

_____ **13.** **Write a formula with the appropriate variation constant that describes the variation of the length of a building in yards (y) with the length of a building in inches (n).**

a. $y = 36n$
b. $n = \frac{36}{y}$
c. $y = \frac{36}{n}$
d. $n = 36y$

_____ **14.** **Find $(f \circ g)(x)$ if $f(x) = x^2 - 1$ and $g(x) = 3x + 5$.**

a. $3x^2 + 2$
b. $3x^2 + 10x + 8$
c. $9x^2 + 30x + 24$
d. $-\frac{4}{3}$ and -3

_____ **15.** **If a function is even, then it is:**

a. level
b. not invertible
c. symmetric to the x-axis
d. symmetric to the origin

_____ **16.** **If $g(x) = \frac{x-1}{2x+3}$, find $g^{-1}(x)$.**

a. $\frac{3x+1}{1-2x}$
b. $\frac{2x+3}{x-1}$
c. $2xy + 3x + 1$
d. $\frac{3x+1}{-2x}$

_____ **17.** **Determine the symmetry of the graph of $f(x) = x^3 + 4x$.**

a. Symmetric to the y-axis
b. Symmetric to $x = 4$
c. Symmetric to the origin
d. No symmetry

_____ **18.** **Jane's Advertising charges \$500 for 1200 flyers and \$780 for 1800 flyers. What is the average rate of change of the cost of the advertising as the number of flyers goes from 1200 to 1800?**

a. \$280.00
b. \$0.23
c. \$0.16
d. \$0.47

 Name:________________________

Multiple Choice: Choose the best answer for each of the following.

_____ **1.** **Which of the following define y as a function of x?**

A. $y = |x-2|+1$ **C.** $x = 2$ **E.** $x = |y|$
B. $4x - 2y = 3$ **D.** $x^2 + y^2 = 4$ **F.** $x^3 + y = 2$

a. B, D, F b. A, C, E c. A, B, F d. A, B, E

_____ **2.** **What is the domain of the relation: $y = \sqrt{x-1}$?**

a. $[-1, \infty)$ b. $[0, \infty)$ c. $[1, \infty)$ d. $(-\infty, \infty)$

_____ **3.** **Find x, if $f(x) = \sqrt{x-4}$ and $f(x) = 3$.**

a. 13 b. 0 c. undefined d. 7

_____ **4.** **Determine the range of $f(x) =$** $\begin{cases} x+1, & for\ x \geq 0 \\ -x+2, & for\ x < 0 \end{cases}$.

a. $[1, 2)$ b. $(-\infty, \infty)$ c. $(-\infty, 0) \cup (0, \infty)$ d. $[1, \infty)$

_____ **5.** **Explain how to use the graph of $y = x^2$ to get the graph of $y = x^2 - 2$.**

a. Translate 2 units left c. Translate 2 units right
b. Translate 2 units down d. Translate 2 units up

_____ **6.** **Solve the inequality $|x+2| - 1 \leq 0$ by using its graph.**

a. $(-\infty, -1]$ b. $[1, 3]$ c. $(-\infty, -3] \cup [1, \infty)$ d. $[-3, -1]$

_____ **7.** **Find the domain of $f + g$ if $f = \{(-1, 0), (-2, 4), (3, 6)\}$ and $g = \{(-1, 0), (0, 5), (3, 2)\}$.**

a. $\{-1, -2, 3\}$ b. $\{-1, -2, 0, 3\}$ c. $\{-1, 0, 3\}$ d. $\{-1, 3\}$

_____ **8.** **If $f(x) = x^2 - 1$ and $g(x) = x + 1$, find $\left(\frac{f}{g}\right)(-1)$.**

a. 0 b. -2 c. undefined d. $-x-1$

_____ **9.** **The area of a rectangle is 20 square feet. Write the perimeter of this rectangle as a function of the length of *one* of its sides, x.**

a. $P = 2x + 2(10 - x)$ c. $P = 2x + 2y$
b. $P = 2x + 2\left(\frac{20}{x}\right)$ d. $P = 2x + 2y - 20$

_____ **10.** **Use f^{-1} to find the range of $f(x) = \frac{3x-1}{x+2}$.**

a. $(-\infty, 3) \cup (3, \infty)$
b. $(-\infty, 0) \cup (0, \infty)$
c. $(-\infty, 2) \cup (2, \infty)$
d. $(-\infty, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$

_____ **11.** **Express the radius of a circle, r, as a function of its circumference C, given $C = \pi d$, where d is the diameter of the circle.**

a. $r = \sqrt{\frac{C}{\pi}}$ b. $C = \pi r^2$ c. $r = \frac{C}{2\pi}$ d. $r = \frac{C}{\pi}$

_____ **12.** **Find the constant of variation for the following: c varies inversely as the square of t and $c = 4$ when $t = 5$.**

a. 100 b. 20 c. $\frac{5}{4}$ d. $\frac{25}{4}$

_____ **13.** **Write a formula with the appropriate variation constant that describes the variation of the length of a building in yards (y) with the length of a building in inches (n).**

a. $n = \frac{36}{y}$ b. $y = \frac{36}{n}$ c. $n = 36y$ d. $y = 36n$

_____ **14.** **Find $(f \circ g)(x)$ if $f(x) = x^2 - 1$and $g(x) = 3x + 5$.**

a. $3x^2 + 2$ b. $9x^2 + 30x + 24$ c. $3x^2 + 10x + 8$ d.$-\frac{4}{3}$ and -3

_____ **15.** **If a function is even, then it is:**

a. level
b. symmetric to the x-axis
c. not invertible
d. symmetric to the origin

_____ **16.** **If $g(x) = \frac{x-1}{2x+3}$, find $g^{-1}(x)$.**

a. $\frac{2x+3}{x-1}$ b. $\frac{3x+1}{1-2x}$ c. $2xy + 3x + 1$ d. $\frac{3x+1}{-2x}$

_____ **17.** **Determine the symmetry of the graph of $f(x) = x^2 + 4x$.**

a. Symmetric to the y-axis
b. Symmetric to $x = -2$
c. Symmetric to the origin
d. No symmetry

_____ **18.** **Jane's Advertising charges \$500 for 1200 flyers and \$780 for 1800 flyers. What is the average rate of change of the cost of the advertising as the number of flyers goes from 1200 to 1800?**

a. \$0.16 b. \$0.47 c. \$280.00 d. \$0.23

Chapter 3 Test -- Form A **Name:**________________________

Solve each problem.

1. Write $y = 2x^2 - 8x + 3$ in the form $y = a(x - h)^2 + k$. Identify the vertex, axis of symmetry, y-intercept, x-intercepts, and range. Sketch the graph.

vertex: ________________
axis of symmetry: ________
y-intercept: ____________
x-intercepts: ____________
range: _________________

2. What is the remainder when $6x^4 - 3x^5 + 2x^3 + x - 3$ is divided by $x + 1$?

2. ______________________

3. Factor completely: $2x^3 + 3x^2 - 11x - 6$.

3. ______________________

4. Find a polynomial equation with real coefficients that has the roots -2 and $2i$.

4. ______________________

5. Find all real and imaginary roots for the polynomial equation $x^2 + 1 = 0$.

5. ______________________

6. The altitude in feet of a projectile t seconds after launch is given by the function $S(t) = -16t^2 + 96t + 4$. Find the maximum altitude reached by the projectile.

6. ______________________

Solve each equation. Find imaginary solutions when possible.

7. $(3x+2)^{2/3} = 25$

8. $|x-2| = \frac{1}{2}x$

7. ______________________

8. ______________________

9. Give the equations of all asymptotes for the graph of the function $f(x) = \frac{2x^2-3x+1}{x^2-1}$.

9. ______________________

Find all of the real and imaginary roots of each equation, stating multiplicity when it is greater than one.

10. $x^5 - 81x = 0$

11. $x^4 + 8x^2 + 16 = 0$

10. ______________________

11. ______________________

Sketch the graph of each function.

12. $y = (x+1)^2(x-2)$

13. $y = \frac{2x}{x^2-1}$

14. Solve the inequality: $\frac{x-3}{x+2} > 4$.

14. ______________________

Chapter 3 Test -- Form B **Name:**________________________

Solve each problem.

1. Write $y = 3x^2 + 12x + 11$ in the form $y = a(x - h)^2 + k$. Identify the vertex, axis of symmetry, y-intercept, x-intercepts, and range. Sketch the graph.

vertex: ________________
axis of symmetry: ________
y-intercept: ____________
x-intercepts: ____________
range: _________________

2. What is the remainder when $3x^3 - x^4 + 2x^2 - 1$ is divided by $x + 1$?

2. ______________________

3. Factor completely: $x^3 - 3x^2 + 4$.

3. ______________________

4. Find a polynomial equation with real coefficients that has the roots 5 and $3i$.

4. ______________________

5. Find all real and imaginary roots for the polynomial equation $x^3 + 16x = 0$.

5. ______________________

6. The altitude in feet of a projectile t seconds after launch is given by the function $S(t) = -16t^2 + 80t + 2$. Find the maximum altitude reached by the projectile.

6. ______________________

Solve each equation. Find imaginary solutions when possible.

7. $(4-x)^{2/3} = 16$

8. $|x-1| = \frac{1}{2}x + 1$

7. ____________________

8. ____________________

9. Give the equations of all asymptotes for the graph of the function $f(x) = \frac{3x^2 - 5x + 2}{x^2 - 4}$.

9. ____________________

Find all of the real and imaginary roots of each equation, stating multiplicity when it is greater than one.

10. $x^5 - 16x = 0$

11. $x^4 + 18x^2 + 81 = 0$

10. ____________________

11. ____________________

Sketch the graph of each function.

12. $y = (x+1)(x-2)^2$

13. $y = \frac{x}{1-x^2}$

14. Solve the inequality: $\frac{x-1}{x-2} > 3$.

14. ____________________

Name:_________________________

Solve each problem.

1. What is the minimum value of y in the function $y = 2x^2 + x - 1$?

1. ______________________

2. Is $(x+2)$ a factor of $f(x) = x^3 - 3x^2 + 11x - 6$? Show work to support your answer.

2. ______________________

3. Write $y = 2x^2 + 12x - 17$ in the form $y = a(x-h)^2 + k$.

3. ______________________

4. Find a polynomial equation with real coefficients that has the roots 2, 0 and $3i$.

4. ______________________

5. The altitude in feet of a projectile t seconds after launch is given by the function $S(t) = -16t^2 + 144t + 32$. Find the maximum altitude reached by the projectile.

5. ______________________

6. Use Descartes Rule of Signs to discuss the possibilities for the roots of $2x^3 - 3x^2 + 5x - 6 = 0$.

6. ______________________

7. Give the equations of all asymptotes for the graph of the function $f(x) = \frac{x^2 - x + 2}{x + 1}$.

7. ______________________

8. Find all real solutions to $\sqrt{x + 5} = 2x$.

8. ______________________

Find all of the real and imaginary roots of each equation, stating multiplicity when it is greater than one.

9. $(x + 5)^{3/2} = 8$

10. $x - 3x^{1/2} - 4 = 0$

9. ______________________

10. ______________________

11. $x^3 + x^2 - 8x - 12 = 0$

12. $x^3 - 2x^2 + 9x - 18 = 0$

11. ______________________

12. ______________________

Sketch the graph of each function.

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

14. $y = \frac{1}{x - 3}$

 Name:_______________________

Solve each problem.

1. What is the minimum value of y in the function $y = 3x^2 - x - 2$?

1. _______________________

2. Is $(x + 1)$ a factor of $f(x) = x^3 + 2x^2 - 13x + 10$? Show work to support your answer.

2. _______________________

3. Write $y = 3x^2 + 12x - 17$ in the form $y = a(x - h)^2 + k$.

3. _______________________

4. Find a polynomial equation with real coefficients that has the roots $-2, 0$ and i.

4. _______________________

5. The altitude in feet of a projectile t seconds after launch is given by the function $S(t) = -16t^2 + 112t + 4$. Find the maximum altitude reached by the projectile.

5. _______________________

6. Use Descartes Rule of Signs to discuss the possibilities for the roots of $-x^3 - x^2 + 7x + 6 = 0$.

6. _______________________

7. Give the equations of all asymptotes for the graph of the function $f(x) = \frac{2x^2 - 3x + 2}{x - 1}$.

7. ______________________

8. Find all real solutions to $x = \sqrt{5x + 6}$.

8. ______________________

Find all of the real and imaginary roots of each equation, stating multiplicity when it is greater than one.

9. $4x^{1/2} = 20$

10. $(x-2)^6 - (x-2) = 0$

9. ______________________

10. ______________________

11. $x^3 + 2x^2 - 13x + 10 = 0$

12. $4x^3 + 8x^2 - 11x + 3 = 0$

11. ______________________

12. ______________________

Sketch the graph of each function.

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

14. $y = \frac{1}{x+2}$

 Name: ________________________

Multiple Choice: Choose the best answer for each of the following.

_____ 1. **Find the x-intercepts of the graph of $f(x) = 3x^2 + 6x - 3$.**

a. $(-1, 0)$
b. $(-1, 0), (3, 0)$
c. $\left(-1+\sqrt{2}, 0\right), \left(-1-\sqrt{2}, 0\right)$
d. $\left(-\sqrt{3}, 0\right), \left(\sqrt{3}, 0\right)$

_____ 2. **Find the axis of symmetry for $y = 2x^2 - 6x + 1$.**

a. $y = 1$ b. $x = -6$ c. $x = 3$ d. $x = \frac{3}{2}$

_____ 3. **Solve the equation $(x-1)^{2/3} = 16$.**

a. $\{5\}$ b. $\{25\}$ c. $\{-63, 65\}$ d. $\{-11, 13\}$

_____ 4. **What is the maximum value of y in the function $y = -x^2 - 3x + 4$?**

a. 4 b. $\frac{7}{4}$ c. $-\frac{25}{4}$ d. $\frac{25}{4}$

_____ 5. **The altitude in feet of a projectile t seconds after launch is given by the function $s(t) = -16t^2 + 64t + 3$. How long after launch will it take for the projectile to reach its maximum height ?**

a. 1 sec. b. 2 sec. c. 2.5 sec. d. 4 sec.

_____ 6. **Solve the inequality $(x-1)^2 < 4$.**

a. $(-\infty, 3)$ b. $(-\infty, -3) \cup (1, \infty)$ c. $(-1, 3)$ d. $(-\infty, -1)$

_____ 7. **Find all real and imaginary roots and state the multiplicity of a root when it is greater than 1 for : $\left(x^3 - x\right)^2\left(x^2 + 4\right) = 0$.**

a. 0(mult 2), ± 1(mult 2), $\pm 2i$
b. 0, ± 1(mult 2), $\pm 2i$
c. 0, ± 1, $\pm 2i$
d. 0, ± 1(mult 2), −2(mult 2)

_____ 8. **What is the remainder when $x^{72} - 3x^{24} + x^{13} + 2x^7 - x + 1$ is divided by $x + 1$?**

a. 0 b. 1 c. 5 d. -3

_____ 9. **Find a polynomial function with real coefficients that has roots -1 and i.**

a. $y = (x+1)(x^2+1)$
b. $y = 1(x-i)$
c. $y = (x+1)(x-i)$
d. $y = (x-i)^2(x+1)$

_____ **10.** **Use the Theorem on Bounds to establish the best integral bounds for the roots of $2x^3 - x^2 - 7x + 6 = 0$.**

a. $[-2, 3]$ b. $[-3, 3]$ c. $[-2, 2]$ d. $[-2, \frac{3}{2}]$

_____ **11.** **Which of the following statements are true?**
A. **If $y = -x^4 + 5x^3 - x^2 + x + 1$, then $y \to \infty$ as $x \to \infty$.**
B. **If (3, 9) and (−3, 9) are both on the graph of P, then the graph is symmetric to the y-axis.**
C. **The graph of $f(x) = (x-1)(x+2)^2$ crosses the x-axis when $x = 1$.**

a. A and B b. B and C c. B only d. C only

_____ **12.** **Solve the equation $|x+1| = |3x-2|$.**

a. $\{\frac{3}{2}\}$ b. $\{-\frac{1}{2}\}$ c. $\{\frac{3}{2}, \frac{1}{4}\}$ d. $\{-\frac{1}{2}, \frac{1}{4}\}$

_____ **13.** **Find all asymptotes for $f(x) = \frac{3x^2 - 5x + 1}{x - 1}$.**

a. $x = 1, y = 3x - 5$
b. $x = 1, y = 3$
c. $x = 1, y = 3x - 2$
d. $x = 1, y = -2x + 1$

_____ **14.** **Find all vertical asymptotes for $g(x) = \frac{x^2 - 1}{x - 1}$.**

a. $y = 1$ b. $x = 1$ c. $x = -1$ d. None

_____ **15.** **Find the domain for $f(x) = 7x(5-6x)^{-1}$.**

a. $\{x \mid x \neq \frac{5}{6}\}$
b. $\{x \mid x > \frac{5}{6}\}$
c. $\{x \mid x \neq 0$ and $x \neq \frac{5}{6}\}$
d. {all real numbers}

_____ **16.** **Solve the equation $(x^2 - 1)^2 + 4(x^2 - 1) - 5 = 0$.**

a. $\pm 2, \pm\sqrt{2}$ b. $2 \pm i, \pm i\sqrt{2}$ c. $\pm 2i, \pm\sqrt{2}$ d. $\pm 2i, 0$

_____ **17.** **A sign in the shape of a right triangle has one leg that is 3 inches longer than the other leg. The longest side in the triangle is 15 inches. What is the perimeter of the triangle?**

a. 30 in. b. 36 in. c. 45 in. d. 52 in.

_____ **18.** **Find the vertex of the graph of the quadratic function:**
$f(x) = -2(x+1)^2 - 3$.

a. $(1, 3)$ b. $(2, 3)$ c. $(1, -3)$ d. $(-1, -3)$

 Name:_______________

Multiple Choice: Choose the best answer for each of the following.

_____ **1.** **Find the x-intercepts for the graph of $f(x) = 2x^2 - 4x - 4$.**

a. $\left(1+\sqrt{3},\, 0\right),\ \left(1-\sqrt{3},\, 0\right)$ c. $(-1,\, 0),\ (3,\, 0)$
b. $(-2,\, 0),\ (-1,\, 0)$ d. $(-1,\, 0),\ (2,\, 0)$

_____ **2.** **Find the axis of symmetry for the graph of $y = 2x^2 + 8x + 5$.**

a. $y = 5$ b. $x = 8$ c. $x = -2$ d. $x = -4$

_____ **3.** **Solve the equation $(x-1)^{3/2} = 27$.**

a. $\{10\}$ b. $\{4\}$ c. $\{19\}$ d. $\{-11,\, 10\}$

_____ **4.** **What is the maximum value of y in the function $y = -x^2 - 5x - 1$?**

a. $\frac{21}{4}$ b. $\frac{5}{2}$ c. $-\frac{26}{4}$ d. 1

_____ **5.** **The altitude in feet of a projectile t seconds after launch is given by the function $s(t) = -16t^2 + 32t + 3$. How long after launch will it take for the projectile to reach its maximum height ?**

a. 1 sec. b. 2 sec. c. 2.5 sec. d. 3 sec.

_____ **6.** **Solve the inequality $x(x+2) < 3$.**

a. $(-\infty,\ -3)$ b. $(-\infty,\ -1) \cup (3,\, \infty)$ c. $(-\infty,\, 1)$ d. $(-3,\, 1)$

_____ **7.** **Find all real and imaginary roots and state the multiplicity of a root when it is greater than 1 for : $\left(x^3 - x\right)^2\left(x^2+4\right) = 0$.**

a. 0(mult 2), $\pm 1,\ \pm 2i$ c. $0,\ \pm 1,\ \pm 2i$
b. 0(mult 2), ± 1(mult 2), $\pm 2i$ d. $0,\ \pm 1$(mult 2), -2(mult 2)

_____ **8.** **What is the remainder when $x^{72} - 3x^{24} + x^{13} + 2x^7 - x + 1$ is divided by $x+1$?**

a. -3 b. 1 c. 5 d. 0

_____ **9.** **Find a polynomial function with real coefficients that has roots -1 and i.**

a. $y = (x+1)(x-i)$ c. $y = 1(x-i)$
b. $y = (x+1)(x^2+1)$ d. $y = (x-i)^2(x+1)$

_____ **10.** **Use the Theorem on Bounds to establish the best integral bounds for the roots of** $2x^3 - 3x^2 + 5x - 6 = 0$.

a. $[-2, 1]$ b. $[-1, 2]$ c. $[-2, 2]$ d. $[-\frac{3}{2}, 2]$

_____ **11.** **Which of the following statements are true?**

A. **If** $y = -x^4 + 5x^3 - x^2 + x + 1$**, then** $y \to \infty$ **as** $x \to \infty$.

B. **If (3, 9) and (−3, 9) are both on the graph of** P**, then the graph is symmetric to the** y**-axis.**

C. **The graph of** $f(x) = (x-1)(x+2)^2$ **crosses the** x**-axis when** $x = 1$.

a. C only b. A and C c. B only d. B and C

_____ **12.** **Find all real solutions to the equation** $x = \sqrt{2x+3}$.

a. $\{\sqrt{2x+3}\}$ b. $\{-2, -3\}$ c. $\{-1, 3\}$ d. $\{3\}$

_____ **13.** **Find all asymptotes for** $f(x) = \frac{2x^2 - 4x + 1}{x+1}$ **.**

a. $x = 1, y = -2x$ c. $x = 1, y = 2x - 4$

b. $x = -1, y = 2x - 4$ d. $x = -1, y = 2x - 6$

_____ **14.** **Find all vertical asymptotes for** $g(x) = \frac{x^2 - 4}{x+2}$ **.**

a. $y = x - 2$ b. $x = 2$ c. $x = -2$ d. None

_____ **15.** **Find the domain for** $f(x) = 7x(5 - 6x)$ **.**

a. $\{x \mid x \neq \frac{5}{6}\}$ c. $\{x \mid x \neq 0$ and $x \neq \frac{5}{6}\}$

b. $\{x \mid x > \frac{5}{6}\}$ d. {all real numbers}

_____ **16.** **Solve the equation** $(x^2+3)^2 + 4(x^2+3) - 5 = 0$.

a. $\pm 2, \pm\sqrt{2}$ b. $\pm\sqrt{2}, \pm i\sqrt{2}$ c. $\pm 2i, \pm\sqrt{2}$ d. $\pm 2i, 0$

_____ **17.** **A sign in the shape of a right triangle has one leg that is 4 inches longer than the other leg. The longest side in the triangle is 20 inches. What is the perimeter of the triangle?**

a. 30 in. b. 36 in. c. 48 in. d. 52 in.

_____ **18.** **Find the vertex of the graph of the quadratic function:** $f(x) = -2(x-1)^2 + 3$.

a. $(1, 3)$ b. $(2, 3)$ c. $(1, -3)$ d. $(-1, -3)$

Name:________________________

Simplify each expression.

1. $\log(100)$

2. $e^{\ln(2)}$

3. $\log_3\left(\frac{1}{81}\right)$

1. ________ 2. ________ 3. ________

Write each expression as a single logarithm.

4. $\log_3(x) - \log_3(y) + \log_3(z-1)$

5. $\frac{1}{2}\log(49) + 3\log(y)$

4. ______________________ 5. ______________________

Find the exact solution to each equation.

6. $2\log_2(x) - \log_2(2) = \log_2(x+4)$

7. $4^{3x} = 8^{3x+1}$

6. ______________________ 7. ______________________

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

8. ______________________

Find an approximate solution (to 4 decimal places) for each equation.

9. $3^{x+1} = 4^x$

10. $\log_x(41) = 2$

9. ______________________ 10. ______________________

Graph each equation in the xy-plane.

11. $f(x) = e^x + 2$

12. $g(x) = \log_2(x-2)$

Solve each problem.

13. Find x, if $f(x) = 2^x$ and $f(x) = \frac{1}{4}$.

13. ______________________

14. A student has found a great investment deal. She has found a way to receive an annual interest rate of 12% compounded quarterly. If she has $600 to invest now and wants to end up with $1000 from this investment, how long would it be before she reaches that value? Round to the nearest tenth of a year.

14. ______________________

15. The radioactive element R decays exponentially. After 7 hours, 35 grams have decayed to 20 grams. What is the rate of decay (to the nearest hundredth) for R?

15. ______________________

16. Find $g^{-1}(x)$ if $g(x) = 2^{x+3}$.

16. ______________________

Chapter 4 Test -- Form B **Name:** ______________________

Simplify each expression.

1. $\log_2(8)$ **2.** $\log\left(\frac{1}{10}\right)$ **3.** $e^{\ln(5)}$

1. _______ 2. _______ 3. _______

Write each expression as a single logarithm.

4. $\log_2(3x) + \log_2(x) - \log_2(y)$ **5.** $\frac{1}{3}\log_3(8) - 2\log_3(x)$

4. ____________________ 5. ____________________

Find the exact solution to each equation.

6. $25^{x+1} = 125^{2x-2}$ **7.** $3\log(x) = \log(x)$

6. ____________________ 7. ____________________

8. $\log_3(x-2) = 1 - \log_3(x)$

8. ____________________

Find an approximate solution (to 4 decimal places) for each equation.

9. $4^{x-2} = 3^x$ **10.** $\log_x(20) = 2$

9. ____________________ 10. ____________________

Graph each equation in the xy-plane.

11. $f(x) = 1 - e^x$

12. $g(x) = \log_3(x+1)$

Solve each problem.

13. Find x, if $f(x) = 4^x$ and $f(x) = \frac{1}{2}$.

13. ______________________

14. A student has found a great investment deal. She has found a way to receive an annual interest rate of 8% compounded semiannually. If she has \$600 to invest now and wants to end up with \$1000 from this investment, how long would it be before she reaches that value? Round to the nearest tenth of a year.

14. ______________________

15. The radioactive element R decays exponentially. After 5 hours, 35 grams have decayed to 20 grams. What is the rate of decay (to the nearest hundredth) for R?

15. ______________________

16. Find $g^{-1}(x)$ if $g(x) = 3^{x-2}$.

16. ______________________

 Name: ________________________

1. Change $3^x = 4$ to logarithmic form.

2. Change $\ln(1) = 0$ to exponential form.

1. ____________________

2. ____________________

Simplify each expression.

3. $\log_5(25)$

4. $7^{\log_7(x)}$

5. $\frac{1}{3}\log_2\left(\frac{1}{8}\right)$

3. ________

4. ________

5. ________

Find the exact solution to each equation.

6. $8^{x-1} = 16^{x+3}$

7. $\log(x) - \log(3) = \log(x+2)$

6. ____________________

7. ____________________

8. $\log_2(5-x) = 2 - \log_2(x)$

8. ____________________

Find an approximate solution (to 4 decimal places) for each equation.

9. $2^{x-1} = 3$

10. $\log_x(24) = -3$

9. ____________________

10. ____________________

Graph each equation in the xy-plane.

11. $f(x) = 2^{-x} + 1$

12. $g(x) = \ln(x + 1)$

Let $f(x) = 2^x$, $g(x) = \left(\frac{1}{3}\right)^{1-x}$, and $h(x) = 4^{2x-1}$. Evaluate each of the following.

13. $f(-2)$

14. $g(1)$

15. $h(0)$

13. ________ 14. ________ 15. ________

Solve each problem.

16. Rewrite the following as a sum and/or difference of multiples of logarithms:

$$\ln\left(\frac{\sqrt{3x-5}}{7x^3}\right).$$

16. ______________________________

17. Find the x-intercept for the graph of $y = e^{(x+2)} - 1$.

17. ________________

18. A radioactive substance decays exponentially at a rate $r = -0.000512$. How many grams are left after 50 years from a 10-gram specimen?

18. ________________

 Name: ______________________

1. Change $5^x = 6$ to logarithmic form.

2. Change $\log(1) = 0$ to exponential form.

1. ____________________

2. ____________________

Simplify each expression.

3. $\log_4(2)$

4. $e^{2\ln(2)}$

5. $\frac{1}{2}\log_3\left(\frac{1}{81}\right)$

3. ________

4. ________

5. ________

Find the exact solution to each equation.

6. $100^{x-1} = 1000^{2x-1}$

7. $\log(x) + \log(2x-1) = \log(3)$

6. ____________________

7. ____________________

8. $\log_6(x) = 1 + \log_6(x-1)$

8. ____________________

Find an approximate solution (to 4 decimal places) for each equation.

9. $3^{x+2} = 5$

10. $\log_x(20) = -2$

9. ____________________

10. ____________________

Graph each equation in the xy-plane.

11. $f(x) = 3^{-x} - 2$

12. $g(x) = \ln(x-2)$

Let $f(x) = \left(\frac{1}{2}\right)^x$, $g(x) = 3^{1-x}$, and $h(x) = 4^{x-2}$. Evaluate each of the following.

13. $f(-2)$

14. $g(1)$

15. $h(0)$

13. _______ 14. _______ 15. _______

Solve each problem.

16. Rewrite the following as a sum and/or difference of multiples of logarithms:

$$\ln\left(\frac{3x^2}{\sqrt{2x+1}}\right).$$

16. ______________________________

17. Find the x-intercept for the graph of $y = e^{(x-1)} + 3$.

17. _______________

18. A radioactive substance decays exponentially at a rate $r = -0.000512$. How many grams are left after 200 years from a 10-gram specimen?

18. _______________

Chapter 4 Test -- Form E **Name: ________________________**

Multiple Choice: Choose the best answer for each of the following.

____ **1.** **If $g(x) = 4^x$, then $g(x) = \frac{1}{2}$ when x equals what value?**

a. $\frac{1}{8}$ b. -2 c. $-\frac{1}{2}$ d. $\frac{1}{2}$

____ **2.** **The range of the function $y = 1 - 2^x$ is given by:**

a. $(-\infty, 1)$ b. $(1, \infty)$ c. $(-\infty, -1)$ d. $(-\infty, \infty)$

____ **3.** **A student wishes to invest \$100 in a savings account yielding 2% annual interest compounded every 6 months. How much will his investment be worth at the end of 1 year?**

a. \$101.01 b. \$102.01 c. \$104.00 d. \$102.02

____ **4.** **The number of spiders, $S(t)$, remaining within a 10-foot radius of their birthplace t days after birth is given by the formula: $S(t) = 200 \cdot 2^{-0.2t}$. Find the number of spiders present within this radius 10 days after their birth.**

a. 50 b. 800 c. 5 d. None are left.

____ **5.** **Evaluate** $\log_2\left(\frac{1}{8}\right)$.

a. $\frac{1}{3}$ b. $\frac{1}{16}$ c. $\frac{1}{4}$ d. -3

____ **6.** **Find the domain of** $f(x) = \log_3(x+1)$.

a. $(1, \infty)$ b. $(-1, \infty)$ c. $(0, \infty)$ d. $(-\infty, \infty)$

____ **7.** **Solve for x:** $2^{x-1} = 3$.

a. $1 + \log_2(3)$ b. $\log_2(4)$ c. 2 d. $1 + \log_3(2)$

____ **8.** **Solve for x:** $2\log_3(x) = \log_3(x+6)$.

a. 5 b. 3 or -2 c. 3 d. 1

____ **9.** **Rewrite as a sum or difference of multiples of logarithms and simplify:**
$\log_2\left(\frac{8\sqrt{x}}{y^2}\right)$.

a. $3 + \frac{1}{2}\log_2(x) - 2\log_2(y)$ c. $\frac{3 + 0.5\log_2(x)}{2\log_2(y)}$

b. $\log_2(8) + \log_2\sqrt{x} + \log_2(y^2)$ d. 0.45

____ 10. **Solve for t, rounding to four decimal places:** $\frac{1}{2} = e^{-0.02t}$.

a. -82.4361 b. 0.5101 c. 34.6574 d. -25

____ 11. **Solve for x, rounding to four decimal places:** $\log_x(22.2) = 3$.

a. 2.8218 b. 10941.0480 c. 2.8105 d. 0.1351

____ 12. **Which of the following statements are true?**

A. $(\ln(x))^2 = 2\ln(x)$

B. $\log_4(3x^4) = 4\log_4(3x)$

C. $\log(x-y) = \frac{\log(x)}{\log(y)}$

D. $\log_3(81^5) = 20$

E. $\log_3\left(\frac{9}{4}\right) = 2 - \log_3(4)$

a. D and E only b. B and C only c. A and E only d. B and D only

____ 13. **Solve for x, giving the *exact* answer:** $x(\log(2)) = 1 + 2x$.

a. $\frac{1}{-2+\log(2)}$ b. $\log(2) - 1$ c. $\log(1)$ d. $\frac{x(\log(2))-1}{2}$

____ 14. **Radioactive element R decays exponentially at a rate of 4% per year. If we begin with 5 grams of R, how long (to the nearest tenth of a year) will it take for only 3 grams to remain?**

a. 45.6 years b. 13.0 years c. 0.7 year d. 12.8 years

____ 15. **Solve for x:** $25^{x-1} = 125^{2x+3}$.

a. -2 b. -1 c. $-\frac{11}{4}$ d. $-\frac{7}{3}$

____ 16. **The population of insects on one square mile in Alaska appears to be growing due to a warming trend in the region according to the formula: $P = 13500 + 2200\ln(t+1)$, where t is the time in years from the present. In how many years will there be 18000 insects in this region? Round to the nearest tenth of a year.**

a. 3.2 years b. 6.7 years c. 35056 years d. 2299 years

 Name:________________________

Multiple Choice: Choose the best answer for each of the following.

____ 1. **If $g(x) = 16^x$, then $g(x) = \frac{1}{4}$ when x equals what value?**

a. $\frac{1}{2}$ b. -2 c. $\frac{1}{64}$ d. $-\frac{1}{2}$

____ 2. **The range of the function $y = 2 - 3^x$ is given by:**

a. $(-\infty, -3)$ b. $(2, \infty)$ c. $(-\infty, -2)$ d. $(-\infty, 2)$

____ 3. **A student wishes to invest \$500 in a savings account yielding 3% annual interest compounded every 6 months. How much will his investment be worth at the end of 1 year?**

a. \$506.02 b. \$515.00 c. \$515.11 d. \$515.19

____ 4. **The number of spiders, $S(t)$, remaining within a 10-foot radius of their birthplace t days after birth is given by the formula: $S(t) = 200 \cdot 2^{-0.2t}$. Find the number of spiders present within this radius 10 days after their birth.**

a. 5 b. 800 c. 50 d. None are left.

____ 5. **Evaluate $\log_3\left(\frac{1}{81}\right)$.**

a. -4 b. $\frac{1}{16}$ c. $\frac{1}{4}$ d. -27

____ 6. **Find the domain of $f(x) = \log_3(x+1)$.**

a. $(0, \infty)$ b. $(1, \infty)$ c. $(-1, \infty)$ d. $(-\infty, \infty)$

____ 7. **Solve for x: $3^{x-1} = 2$.**

a. $1 + \log_2(3)$ b. $\log_2(4)$ c. 2 d. $1 + \log_3(2)$

____ 8. **Solve for x: $2\log_3(x) = \log_3(x+12)$.**

a. -3 or 4 b. 4 c. 6 d. 12

____ 9. **Rewrite as a sum or difference of multiples of logarithms and simplify:**
$\log_2\left(\frac{8\sqrt{x}}{y^2}\right)$.

a. 0.45

b. $\log_2(8) + \log_2\sqrt{x} + \log_2(y^2)$

c. $\dfrac{3 + 0.5\log_2(x)}{2\log_2(y)}$

d. $3 + \frac{1}{2}\log_2(x) - 2\log_2(y)$

____ **10.** **Solve for t, rounding to four decimal places:** $\frac{1}{2} = e^{-0.02t}$.

a. -82.4361 b. 0.5101 c. 34.6574 d. -25

____ **11.** **Solve for x, rounding to four decimal places:** $\log_x(22.2) = 3$.

a. 0.1351 b. 10,941.0480 c. 2.8218 d. 2.8105

____ **12.** **Which of the following statements are true?**

A. $(\ln(x))^2 = 2\ln(x)$

B. $\log_4(3x^4) = 4\log_4(3x)$

C. $\log(x-y) = \frac{\log(x)}{\log(y)}$

D. $\log_3(81^5) = 20$

E. $\log_3\left(\frac{9}{4}\right) = 2 - \log_3(4)$

a. D and E only b. B and C only c. A and E only d. B and D only

____ **13.** **Solve for x, giving the *exact* answer:** $x(\log(2)) = 1 + 2x$.

a. 0 b. $\log(2) - 1$ c. $\frac{1}{-2+\log(2)}$ d. $\frac{x(\log(2))-1}{2}$

____ **14.** **Radioactive element R decays exponentially at a rate of 3% per year. If we begin with 5 grams of R, how long (to the nearest tenth of a year) will it take for only 3 grams to remain?**

a. 200 years b. 59.7 years c. 17.0 years d. 1.7 years

____ **15.** **Solve for x:** $25^{2x+3} = 125^{x-1}$.

a. 6 b. -9 c. -4 d. $\frac{8}{3}$

____ **16.** **The population of insects on one square mile in Alaska appears to be growing due to a warming trend in the region according to the formula: $P = 13500 + 2200\ln(t+1)$, where t is the time in years from the present. In how many years will there be 18000 insects in this region? Round to the nearest tenth of a year.**

a. 6.7 years b. 35056 years c. 2299 years d. 3.2 years

Name: ________________________

Find the exact value of each expression.

1. $\sin(570°)$ **2.** $\cos\left(-\frac{\pi}{3}\right)$ **3.** $\tan\left(\frac{2\pi}{3}\right)$

1. _______ 2. _______ 3. _______

4. $\csc(315°)$ **5.** $\sec\left(\frac{\pi}{4}\right)$ **6.** $\cot(-270°)$

4. _______ 5. _______ 6. _______

7. $\arcsin\left(\frac{\sqrt{2}}{2}\right)$ **8.** $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ **9.** $\cot^{-1}\left(-\sqrt{3}\right)$

7. _______ 8. _______ 9. _______

10. $\cos^{-1}(0)$ **11.** $\sin\left(\cos^{-1}\left(\frac{4}{5}\right)\right)$ **12.** $\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$

10. _______ 11. _______ 12. _______

Sketch at least one cycle of the graph of each function. Draw and label the axes appropriately. Determine the period, range, and amplitude for each function, as required.

13. $y = \sin\left(x - \frac{\pi}{4}\right)$

period: _______
range: _______
amplitude: _______

14. $y = \tan(2x - \pi)$

period: _______
range: _______

15. $y = -\sec(x) + \pi$

period: _______
range: _______

Solve each problem.

16. Find the exact value of the arc length intercepted by a central angle of 105° in a circle with a radius of 9 centimeters.

16. ____________________

17. Find the exact value of cos θ for an angle θ in standard position whose terminal side contains the point $(-5, 6)$.

17. ____________________

18. Matt, a six-footer, spies a red-headed woodpecker on the branch of a tree in his yard. From the ground, the angle of elevation along his line of sight to the bird is 28°. He walks 20 feet towards the tree, and in the same plane as before, now sees the bird at an angle of elevation of 42°. How high in the tree is the bird? Round answer to the nearest foot.

18. ____________________

19. At what speed in miles per hour will a bicycle travel if the rider can cause the 26-inch diameter wheel to rotate 90 revolutions per minute? Round answer to the nearest tenth.

19. ____________________

20. The population in a particular herd of antelope in South Africa oscillates between approximately 500 and 800. The maximum number can be found at the beginning of January, while the minimum number of can be found at the beginning of July. Express the population as a function of time in the form $y = A\ \sin(B(x - C)) + D$, where January is counted as month one $(x = 1)$.

20. ____________________

Chapter 5 Test -- Form B **Name:** ______________________

Find the exact value of each expression.

1. $\cos(570°)$ **2.** $\cot\left(-\frac{\pi}{3}\right)$ **3.** $\sin\left(\frac{2\pi}{3}\right)$

1. _______ 2. _______ 3. _______

4. $\sec(315°)$ **5.** $\csc\left(\frac{\pi}{4}\right)$ **6.** $\tan(-270°)$

4. _______ 5. _______ 6. _______

7. $\arcsin\left(\frac{1}{2}\right)$ **8.** $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ **9.** $\cot^{-1}\left(\frac{\sqrt{3}}{3}\right)$

7. _______ 8. _______ 9. _______

10. $\cos^{-1}(1)$ **11.** $\sin\left(\cos^{-1}\left(\frac{5}{13}\right)\right)$ **12.** $\sin^{-1}\left(\sin\left(\frac{5\pi}{4}\right)\right)$

10. _______ 11. _______ 12. _______

Sketch at least one cycle of the graph of each function. Draw and label the axes appropriately. Determine the period, range, and amplitude for each function, as required.

13. $y = 3\csc(2x)$

period: _______
range: _______

14. $y = \frac{1}{3}\cos(x) + 1$

period: _______
range: _______
amplitude: _______

15. $y = \tan\left(x - \frac{\pi}{4}\right)$

period: _______
range: _______

Solve each problem.

16. Find the exact value of the arc length intercepted by a central angle of 205° in a circle with a radius of 3 centimeters.

16. ____________________

17. Find the exact value of cos θ for an angle θ in standard position whose terminal side contains the point $(-3, 7)$.

17. ____________________

18. Matt, a six-footer, spies a red-headed woodpecker on the branch of a tree in his yard. From the ground, the angle of elevation along his line of sight to the bird is 26°. He walks 20 feet towards the tree, and in the same plane as before, now sees the bird at an angle of elevation of 40°. How high in the tree is the bird? Round answer to the nearest foot.

18. ____________________

19. At what speed in miles per hour will a bicycle travel if the rider can cause the 26-inch diameter wheel to rotate 100 revolutions per minute? Round answer to the nearest tenth.

19. ____________________

20. The population in a particular herd of antelope in South Africa oscillates between approximately 400 and 900. The maximum number can be found at the beginning of February, while the minimum number of can be found at the beginning of August. Express the population as a function of time in the form $y = A \sin(B(x - C)) + D$, where January is counted as month one $(x = 1)$.

20. ____________________

 Name: ________________________

Find the exact value of each expression.

1. $\cos(-600°)$ **2.** $\tan\left(\frac{3\pi}{4}\right)$ **3.** $\sin\left(\frac{3\pi}{2}\right)$

1. _______ 2. _______ 3. _______

4. $\csc\left(-\frac{\pi}{6}\right)$ **5.** $\cot\left(\frac{4\pi}{3}\right)$ **6.** $\sec\left(-\frac{7\pi}{4}\right)$

4. _______ 5. _______ 6. _______

7. $\arccos\left(\frac{\sqrt{2}}{2}\right)$ **8.** $\cos^{-1}(-1)$ **9.** $\arctan\left(\frac{\sqrt{3}}{3}\right)$

7. _______ 8. _______ 9. _______

10. $\csc^{-1}(-2)$ **11.** $\sec\left(\arccos\left(\frac{2}{5}\right)\right)$ **12.** $\sin^{-1}\left(\sin\left(\frac{5\pi}{3}\right)\right)$

10. _______ 11. _______ 12. _______

Sketch at least one cycle of the graph of each function. Draw and label the axes appropriately. Determine the period, range, and amplitude for each function, as required.

13. $y = \sin\left(x - \frac{\pi}{3}\right)$

period: _______
range: _______
amplitude: _______

14. $y = 2\sec(x) + 1$

period: _______
range: _______

15. $y = \tan\left(\frac{1}{2}x\right)$

period: _______
range: _______

Solve each problem.

16. Find sin α if tan $\alpha = \frac{4}{7}$ and α is not in quadrant I.

16. ____________________

17. Find the exact value of cos θ for an angle θ in standard position whose terminal side contains the point $(-2,\ -3)$.

17. ____________________

18. From a point on the bank of a river to the top of a 100-foot high cliff, directly across the river, the angle of elevation is 53°. How wide is the river?

18. ____________________

19. If 3950 miles is the approximate radius of Earth, find the distance along the surface of Earth from the equator to the North Pole. Round to to the nearest mile.

19. ____________________

20. The population in a particular herd of antelope in South Africa oscillates between approximately 300 and 900. The maximum number can be found at the beginning of March, while the minimum number of can be found at the beginning of September. Express the population as a function of time in the form $y = A\ \sin(B(x - C)) + D$, where January is counted as month one $(x = 1)$.

20. ____________________

Chapter 5 Test -- Form D **Name:** ________________________

Find the exact value of each expression.

1. $\cos(930°)$ **2.** $\tan\left(\frac{5\pi}{6}\right)$ **3.** $\sin(-\pi)$

1. _______ 2. _______ 3. _______

4. $\csc\left(-\frac{\pi}{4}\right)$ **5.** $\cot\left(\frac{7\pi}{6}\right)$ **6.** $\sec\left(-\frac{5\pi}{3}\right)$

4. _______ 5. _______ 6. _______

7. $\arccos\left(-\frac{1}{2}\right)$ **8.** $\cos^{-1}(0)$ **9.** $\arctan(-1)$

7. _______ 8. _______ 9. _______

10. $\csc^{-1}\left(\frac{2\sqrt{3}}{3}\right)$ **11.** $\csc\left(\arctan\left(\frac{3}{4}\right)\right)$ **12.** $\sin^{-1}\left(\sin\left(\frac{2\pi}{3}\right)\right)$

10. _______ 11. _______ 12. _______

Sketch at least one cycle of the graph of each function. Draw and label the axes appropriately. Determine the period, range, and amplitude for each function, as required.

13. $y = 2\cos(\pi x)$

period: _______
range: _______
amplitude: _______

14. $y = \tan\left(x - \frac{\pi}{6}\right)$

period: _______
range: _______

15. $y = \frac{1}{2}\csc(x) - \frac{\pi}{3}$

period: _______
range: _______

Solve each problem.

16. Find tan α if sin $\alpha = -\frac{2}{3}$ and α is not in quadrant III.

16. ____________________

17. Find the exact value of cos θ for an angle θ in standard position whose terminal side contains the point $(1, -4)$.

17. ____________________

18. From a point on the bank of a stream to the top of a 50-foot high cliff, directly across the stream, the angle of elevation is 73°. How wide is the stream?

18. ____________________

19. If 3950 miles is the approximate radius of Earth, find the distance along the surface of Earth from the South Pole to the North Pole. Round to to the nearest mile.

19. ____________________

20. The population in a particular herd of antelope in South Africa oscillates between approximately 200 and 500. The maximum number can be found at the beginning of February, while the minimum number of can be found at the beginning of August. Express the population as a function of time in the form $y = A$ sin$(B(x - C)) + D$, where January is counted as month one $(x = 1)$.

20. ____________________

 Name: ________________________

Multiple Choice: Choose the best answer for each.

_____ **1.** **Two-thirds of a clockwise revolution is:**

a. $-120°$ b. $\frac{2}{3}\pi$ c. $240°$ d. $-240°$

_____ **2.** **Use a calculator to find the best estimate for cot 2.1.**

a. 27.27 b. 64.54 c. 1.126 d. -0.585

_____ **3.** **Convert 150°to radian measure.**

a. $\frac{2\pi}{3}$ b. $\frac{5\pi}{6}$ c. $-\frac{7\pi}{6}$ d. 2.62

_____ **4.** **α and β are complementary angles if:**

a. $\alpha - \beta = 90°$ b. $\alpha = 90° - \beta$ c. $\alpha + \beta = 180°$ d. $\alpha = -\beta$

_____ **5.** **Which of the following is equal to sin 30°?**

a. $\frac{\sqrt{3}}{2}$ b. $\sin(-30°)$ c. $\cos 60°$ d. $\frac{1}{\sec 30°}$

_____ **6.** **Find the sine of the smallest acute angle in a right triangle with legs of lengths $2\sqrt{5}$ and $2\sqrt{3}$.**

a. $\frac{\sqrt{86}}{2\sqrt{3}}$ b. $\frac{\sqrt{3}}{\sqrt{5}}$ c. $\frac{\sqrt{5}}{2\sqrt{2}}$ d. $\frac{\sqrt{3}}{2\sqrt{2}}$

_____ **7.** **Find $\tan\theta$ if $\cos\theta = \frac{12}{13}$ and θ is in quadrant IV.**

a. $-\frac{12}{5}$ b. $-\frac{13}{12}$ c. $-\frac{5}{12}$ d. $\frac{5}{12}$

_____ **8.** **Find $\cos\theta$ if θ is an angle in standard position whose terminal side contains the point $(-1, -2)$.**

a. $-\frac{1}{\sqrt{5}}$ b. $\frac{1}{\sqrt{5}}$ c. $\frac{1}{\sqrt{3}}$ d. $-\frac{2}{\sqrt{3}}$

_____ **9.** **Assume θ is an angle in standard position. Find the quadrant in which θ lies if you know that $\sin\theta > 0$ and $\sec\theta < 0$.**

a. QI b. QII c. QIII d. QIV

_____ **10.** **If $\csc\theta = -\frac{5}{3}$, then $\sin\theta =$**

a. $\frac{5}{3}$ b. $-\frac{3}{5}$ c. $\frac{4}{5}$ d. $-\frac{4}{5}$

_____ **11.** $\cos\left(\frac{19\pi}{2}\right) =$

a. -1 b. 1 c. 0 d. $\frac{\sqrt{3}}{2}$

_____ **12.** $\tan\left(\frac{3\pi}{2}\right) =$

a. -1 b. 1 c. 0 d. undefined

_____ **13.** **Which of the following is equal to sec $(-300°)$?**

a. $\cos 60°$ b. $\cos^{-1}(60°)$ c. $\sec 60°$ d. $\cos^{-1}(-300°)$

_____ **14.** **Give an angle θ such that $-\pi \leq \theta < \pi$ so that θ is coterminal with $-\frac{13\pi}{3}$.**

a. $\frac{2\pi}{3}$ b. $-\frac{2\pi}{3}$ c. $-\frac{7\pi}{3}$ d. $-\frac{\pi}{3}$

_____ **15.** **If $y = -\frac{2}{3}\cos\left(3x - \frac{\pi}{2}\right) + 1$, then its period is:**

a. $\frac{2\pi}{3}$ b. $\frac{\pi}{3}$ c. $\frac{\pi}{6}$ d. $\frac{3\pi}{2}$

_____ **16.** **If $y = -\frac{2}{3}\cos\left(3x - \frac{\pi}{2}\right) + 1$, then its range is:**

a. $\left[\frac{1}{3}, \frac{5}{3}\right]$ b. $\left[-\frac{2}{3}, \frac{2}{3}\right]$ c. $\left[-\frac{\pi}{6}, \frac{11}{6}\right]$ d. $[-1, 1]$

_____ **17.** $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) =$

a. $\sqrt{2}$ b. $-\frac{\pi}{4}$ c. $\frac{\pi}{4}$ d. $\frac{3\pi}{4}$

_____ **18.** $\arccos\left(-\frac{1}{2}\right) =$

a. $-\frac{\sqrt{3}}{2}$ b. $-\frac{2\pi}{3}$ c. $\frac{2\pi}{3}$ d. $\frac{5\pi}{6}$

_____ **19.** $\tan\left(\sin^{-1} 1\right) =$

a. 1 b. 0 c. $\frac{\pi}{2}$ d. undefined

_____ **20.** **A tower is 275 feet high. From its top, the angle of depression to an rock on the ground is 25°. Find the distance from the base of the tower to the rock.**

a. 589.7 feet b. 36.7 feet c. 128.2 feet d. 404.3 feet

 Name: ________________________

Multiple Choice: Choose the best answer for each.

_____ **1.** **Two-thirds of a counterclockwise revolution is:**

a. $-120°$ b. $\frac{2}{3}\pi$ c. $240°$ d. $-240°$

_____ **2.** **Use a calculator to find the best estimate for csc 0.15.**

a. 8.627 b. 6.691 c. 0.151 d. 381.972

_____ **3.** **Convert 210° to radian measure.**

a. $\frac{2\pi}{3}$ b. $-\frac{5\pi}{6}$ c. $\frac{7\pi}{6}$ d. 3.67

_____ **4.** **α and β are complementary angles if:**

a. $\alpha - \beta = 90°$ b. $\alpha = -\beta$ c. $\alpha + \beta = 180°$ d. $\alpha = 90° - \beta$

_____ **5.** **Which of the following is equal to sin 30°?**

a. $\sin(-30°)$ b. $\cos 60°$ c. $\frac{1}{\sec 30°}$ d. $\frac{\sqrt{3}}{2}$

_____ **6.** **Find the sine of the smallest acute angle in a right triangle with legs of lengths $2\sqrt{5}$ and $2\sqrt{3}$.**

a. $\frac{\sqrt{86}}{2\sqrt{3}}$ b. $\frac{\sqrt{3}}{\sqrt{5}}$ c. $\frac{\sqrt{3}}{2\sqrt{2}}$ d. $\frac{\sqrt{5}}{2\sqrt{2}}$

_____ **7.** **Find $\sin\theta$ if $\cos\theta = \frac{12}{13}$ and θ is in quadrant IV.**

a. $-\frac{12}{5}$ b. $-\frac{5}{13}$ c. $-\frac{13}{12}$ d. $\frac{12}{13}$

_____ **8.** **Find $\cos\theta$ if θ is an angle in standard position whose terminal side contains the point $(1, -3)$.**

a. $-\frac{1}{\sqrt{10}}$ b. $\frac{1}{\sqrt{10}}$ c. $\frac{1}{4}$ d. $-\frac{3}{\sqrt{10}}$

_____ **9.** **Assume θ is an angle in standard position. Find the quadrant in which θ lies if you know that $\cos\theta > 0$ and $\csc\theta < 0$.**

a. QI b. QII c. QIII d. QIV

_____ **10.** **If $\csc\theta = -\frac{5}{3}$, then $\sin\theta =$**

a. $\frac{5}{3}$ b. $-\frac{4}{5}$ c. $\frac{4}{5}$ d. $-\frac{3}{5}$

_____ **11.** **cos**$\left(\frac{17\pi}{2}\right) =$

a. -1 b. 1 c. 0 d. $\frac{\sqrt{3}}{2}$

_____ **12.** **tan**$(\,3\pi) \;=$

a. -1 b. 1 c. 0 d. undefined

_____ **13.** **Which of the following is equal to csc (−300°)?**

a. csc 60° b. $\sin^{-1}(60°)$ c. sin 60° d. $\sin^{-1}(-300°)$

_____ **14.** **Give an angle θ such that $-\,\pi \le \theta < \pi$ so that θ is coterminal with $-\,\frac{14\pi}{3}$.**

a. $\frac{2\pi}{3}$ b. $-\,\frac{2\pi}{3}$ c. $-\,\frac{\pi}{3}$ d. $-\,\frac{7\pi}{3}$

_____ **15.** **If $y = -\,\frac{2}{3}\cos\left(3x - \frac{\pi}{2}\right) + 1$, then its period is:**

a. $\frac{3\pi}{2}$ b. $\frac{\pi}{3}$ c. $\frac{\pi}{6}$ d. $\frac{2\pi}{3}$

_____ **16.** **If $y = -\,\frac{2}{3}\cos\left(3x - \frac{\pi}{2}\right) + 1$, then its range is:**

a. $[-1, 1]$ b. $\left[-\,\frac{2}{3}\,,\,\frac{2}{3}\right]$ c. $\left[-\,\frac{\pi}{6}\,,\,\frac{11}{6}\right]$ d. $\left[\frac{1}{3}\,,\,\frac{5}{3}\right]$

_____ **17.** **sin**$^{-1}\left(-\,\frac{1}{2}\right) =$

a. 2 b. $-\,\frac{\pi}{3}$ c. $\frac{\pi}{3}$ d. $-\,\frac{\pi}{6}$

_____ **18.** **arccos** $\left(-\,\frac{\sqrt{2}}{2}\right) =$

a. $-\,\frac{\pi}{4}$ b. $-\,\sqrt{2}$ c. $\frac{\pi}{4}$ d. $\frac{3\pi}{4}$

_____ **19.** **tan** $\left(\mathbf{sin}^{-1}\,(\,-\,1)\right) =$

a. 1 b. 0 c. $\frac{3\pi}{2}$ d. undefined

_____ **20.** **A tower is 275 feet high. From its top, the angle of depression to an rock on the ground is 35°. Find the distance from the base of the tower to the rock.**

a. 128 feet b. 393 feet c. 17.0 feet d. 2,060 feet

Chapter 6 Test -- Form A **Name:** ______________________

Use identities to simplify each expression.

1. $\cos\theta \cdot \csc\theta \cdot \tan\theta$

2. $\dfrac{\sin x + \cos x}{\sin x}$

1. ____________________

2. ____________________

3. $\dfrac{2\tan\left(\frac{\pi}{12}\right)}{1-\tan^2\left(\frac{\pi}{12}\right)}$

4. $\sin\left(x+\frac{\pi}{3}\right) - \cos\left(x+\frac{\pi}{6}\right)$

3. ____________________

4. ____________________

Prove that each of the following equations is an identity.

5. $\cot\theta \cdot \cos\theta = \csc\theta - \sin\theta$

6. $(\cot x + 1)^2 - \csc^2 x = \dfrac{2\cos x}{\sin x}$

7. $\dfrac{\csc\beta}{\tan\beta + \cot\beta} = \cos\beta$

8. $\tan\beta + \dfrac{\cos\beta}{1+\sin\beta} = \sec\beta$

Find all solutions to each equation.

9. $2\sin x = 1$

10. $\tan 2x = 1$

9. ____________________

10. ____________________

Find all values of x in [0°, 360°) that satisfy each equation.

11. $\sin x = \cos x$

12. $2\sin^2 x - \sin x - 1 = 0$

11. ____________________

12. ____________________

Solve each problem.

13. Write $y = \sin x + \cos x$ in the form $y = A\sin(x + c)$ and graph one cycle of the function. Label axes appropriately. Determine the period, amplitude and phase shift.

$y =$ ____________________
amplitude: ______________
phase shift: ____________
period: _________________

14. Use an appropriate identity to find the exact value of tan 22.5°.

14. ____________________

15. Prove that the equation $\sin 2\theta = 2\sin\theta$ is not an identity.

16. Use a product-to-sum identity to find the exact value of $\cos(105°) \cdot \sin(75°)$.

16. ____________________

 Name: ________________________

Use identities to simplify each expression.

1. $\frac{\cos x}{\cot x}$

2. $2 \sin x \cdot \cot x \cdot \sec x$

1. ____________________

2. ____________________

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

4. $\sin 2x \cdot \cos x - \sin x \cdot \cos 2x$

3. ____________________

4. ____________________

Prove that each of the following equations is an identity.

5. $\sec \theta - \cos \theta = \tan \theta \cdot \sin \theta$

6. $(\tan \theta + 1)^2 = \sec \theta\,(\sec \theta + 2 \sin \theta)$

7. $\cos(\beta - 270°) = -\sin \beta$

8. $\tan^2 x - \cot^2(-x) + \csc^2 x = \sec^2(-x)$

Find all solutions to each equation.

9. $2 \cos \theta = \sqrt{3}$

10. $\sin^2 x - 3 \sin x = 0$

9. ____________________

10. ____________________

Find all values of θ in [0°, 360°) that satisfy each equation. Round approximate answers to the nearest tenth of a degree.

11. $\cos \theta - 2 \sin^2\theta = 1$

12. $\frac{2 \tan \theta}{1 - \tan^2\theta} = 1$

11. ____________________

12. ____________________

Solve each problem.

13. Write $y = \sin x - \cos x$ in the form $y = A \sin(x + c)$ and graph one cycle of the function. Label axes appropriately. Determine the period, amplitude and phase shift.

$y =$ __________
amplitude: __________
phase shift: __________
period: __________

14. Use an appropriate identity to find the exact value of cos 67.5°.

14. ____________________

15. Prove that the equation $\cos 3\theta = 3 \cos \theta$ is not an identity.

16. Use a product-to-sum identity to find the exact value of cos(75°) · sin(105°).

16. ____________________

Chapter 6 Test -- Form C **Name:** ______________________

Use identities to simplify each expression.

1. $\tan x \cdot \sin x + \cos x$

2. $-\frac{\cos(-x)}{\sin(-x)}$

1. ____________________

2. ____________________

3. $\sec\theta - \sin\theta \cdot \tan\theta$

4. $\frac{\tan(43°) + \tan(17°)}{1 - \tan(43°) \cdot \tan(17°)}$

3. ____________________

4. ____________________

Prove that each of the following equations is an identity.

5. $\cos^4 x - \sin^4 x = 2\cos^2 x - 1$

6. $\left(\frac{1}{\csc\theta}\right)^2 + (1 + \cos\theta)^2 = 2(1 + \cos\theta)$

7. $\cos x \cdot \cos(60° + x) + \sin x \cdot \sin(60° + x) = \frac{1}{2}$

8. $\sin^2\theta + \sin^2\theta(\csc^2\theta + \cot^2\theta) = 2$

Find all solutions to each equation.

9. $\sec\theta = 2$

10. $\cos^2 x = 4\cos x$

9. ____________________

10. ____________________

Find all values of α in [0°, 360°) that satisfy each equation. Round approximate answers to the nearest tenth of a degree.

11. $2 \sin 2\alpha = 1$

12. $0.5 \cos 3\alpha - 0.3 \sin 3\alpha = 0$

11. ____________________

12. ____________________

Solve each problem.

13. The distance d (in feet) traveled by a projectile fired at an angle θ is related to the initial velocity v_0 (in feet per second) by the equation $v_0^2 \sin 2\theta = 32d$. At what angle should a projectile be launched for it to travel 156.25 feet at an initial velocity of 100 ft/sec, given that it must clear a ten-foot high wall that is 20 feet away in its line of fire?

13. ____________________

14. Use an appropriate identity to find the exact value of $\tan\left(-\frac{\pi}{12}\right)$.

14. ____________________

15. Find the exact value of $\sin(\alpha + \beta)$ if $\sin \alpha = \frac{3}{5}$ and $\cos \beta = -\frac{2}{5}$, with α in quadrant II and β in quadrant III.

15. ____________________

16. Determine whether the function $f(x) = \frac{\sin x + \tan x}{\sec x}$ is odd, even, or neither. Show work to support your answer.

16. ____________________

Chapter 6 Test -- Form D **Name:** ____________________

Use identities to simplify each expression.

1. $\cot x \cdot \cos x + \sin x$

2. $-\dfrac{\sin(-x)}{\cos(-x)}$

1. ____________________

2. ____________________

3. $\csc \theta - \cos \theta \cdot \cot \theta$

4. $\dfrac{\tan(73°) + \tan(47°)}{1 - \tan(73°) \cdot \tan(47°)}$

3. ____________________

4. ____________________

Prove that each of the following equations is an identity.

5. $\cos^4 x - \sin^4 x = 1 - 2\sin^2 x$

6. $\left(\dfrac{1}{\sec \theta}\right)^2 + (1 + \sin \theta)^2 = 2(1 + \sin \theta)$

7. $\cos x \cdot \cos(90° + x) + \sin x \cdot \sin(90° + x) = 0$

8. $\dfrac{\sec \theta}{\cot \theta + \tan \theta} = \sin \theta$

Find all solutions to each equation.

9. $\csc \theta = 2$

10. $\sin^3 x = \frac{1}{2} \sin x$

9. ____________________

10. ____________________

Find all values of α in [0°, 360°) that satisfy each equation. Round approximate answers to the nearest tenth of a degree.

11. $2 \sin 2\alpha = \sqrt{3}$

12. $5 \sin^2 x - \sin x - 4 = 0$

11. ____________________

12. ____________________

Solve each problem.

13. The distance d (in feet) traveled by a projectile fired at an angle θ is related to the initial velocity v_0 (in feet per second) by the equation $v_0^2 \sin 2\theta = 32d$. At what angle should a projectile be launched for it to travel 156.25 feet at an initial velocity of 100 ft/sec, given that it must clear a ten-foot high wall that is 20 feet away in its line of fire?

13. ____________________

14. Use an appropriate identity to find the exact value of $\sin\left(-\frac{\pi}{12}\right)$.

14. ____________________

15. Find the exact value of $\sin(\alpha - \beta)$ if $\sin \alpha = \frac{3}{5}$ and $\cos \beta = -\frac{2}{5}$, with α in quadrant II and β in quadrant III.

15. ____________________

16. Determine whether the function $f(x) = \frac{\sin x + \tan x}{\csc x}$ is odd, even, or neither. Show work to support your answer.

16. ____________________

 Name: ________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **Use identities to simplify: $\tan\theta \sin\theta + \cos\theta$.**

a. $\tan\theta$ b. $2\cos\theta$ c. $\sec\theta$ d. $\sin^2\theta + 1$

_____ **2.** **Use identities to simplify: $\dfrac{\sec\theta}{\cot\theta + \tan\theta}$.**

a. $2\sec\theta$ b. $\sec\theta$ c. 1 d. $\sin\theta$

_____ **3.** **Discuss the symmetry of the graph of $f(x) = x + \sin x$.**

a. Symmetric to the origin
b. Symmetric to the x-axis
c. Symmetric to the y-axis
d. No symmetry

_____ **4.** **Factor completely: $\sin^2\theta - 2\sin\theta - 3$.**

a. $-\sin\theta - 3$
b. $(\sin\theta - 3)(\sin\theta + 1)$
c. $\sin\theta(\sin\theta - 2) - 3$
d. $\sin\theta(\sin\theta - 5)$

_____ **5.** **Which of the following are identities?**

A. $\dfrac{-\sin(-\alpha)}{\cos(-\alpha)} = \tan\alpha$ **C.** $(\sin x + 1)^2 + \cos^2 x = 2$

B. $\sec\theta - \sin\theta \cdot \tan\theta = \cos\theta$ **D.** $\dfrac{\sin\theta + \cos\theta}{\cos\theta} = \tan\theta + 1$

a. B, D b. A, B, C c. A, B, D d. All are identities

_____ **6.** **Find the exact value of $\cos 255°$.**

a. $\frac{\sqrt{2} - \sqrt{6}}{4}$ b. $-\frac{\sqrt{2}}{2}$ c. $\frac{\sqrt{6} + \sqrt{2}}{4}$ d. $\frac{1 - \sqrt{3}}{2}$

_____ **7.** **If $\sin\alpha = \frac{3}{5}$, $\sin\beta = \frac{5}{13}$, α is in quadrant I and β is in quadrant II, find $\sin(\alpha - \beta)$.**

a. $-\frac{56}{65}$ b. $\frac{16}{65}$ c. $\frac{24}{65}$ d. $\frac{56}{65}$

_____ **8.** **Simplify: $\dfrac{\tan 43° + \tan 17°}{1 - \tan 43° \tan 17°}$.**

a. $\frac{\sqrt{3}}{3}$ b. $\sqrt{3}$ c. $\tan 26°$ d. $\tan 731°$

_____ **9.** **Find $\cos 2\theta$ if $\cos\theta = \frac{5}{13}$ and θ is in quadrant IV.**

a. $\frac{119}{169}$ b. $\frac{10}{13}$ c. $-\frac{10}{13}$ d. $-\frac{119}{169}$

_____ **10.** **Write as a single trigonometric function: $2\cos x \cdot \sin^3 x + 2\sin x \cdot \cos^3 x$.**

a. $2\sin 2x$ b. $\sin 2x$ c. $4(\sin 2x)^4$ d. $4\sin^4 x \cdot \cos^4 x$

_____ **11.** **If $\cos\theta = -\frac{12}{13}$ and θ is in quadrant III, find $\sin\frac{\theta}{2}$.**

a. $-\frac{\sqrt{26}}{26}$ b. $-\frac{5}{26}$ c. $\frac{5\sqrt{26}}{26}$ d. $-\frac{5\sqrt{26}}{26}$

_____ **12.** **Find the exact value of $\cos(67.5°) \cdot \sin(112.5°)$.**

a. $\frac{\sqrt{2}}{4}$ b. $-\frac{\sqrt{2}}{4}$ c. 0.35 d. 1

_____ **13.** **Rewrite $\sin x + \cos x$ in the form $A\sin(x + c)$.**

a. $2\sin\left(x - \frac{\pi}{4}\right)$ b. $\sin(x + 1)$ c. $\sin\left(x + \frac{\pi}{4}\right)$ d. $\sqrt{2}\sin\left(x + \frac{\pi}{4}\right)$

_____ **14.** **Find all real numbers which solve the equation $\sec x = 2$.**

a. $\{x \mid x = \frac{\pi}{3} + 2k\pi$ or $x = \frac{5\pi}{3} + 2k\pi$, for any integer $k\}$
b. $\{x \mid x = \frac{\pi}{6} + 2k\pi$ or $x = \frac{11\pi}{6} + 2k\pi$, for any integer $k\}$
c. $\{x \mid x = \frac{\pi}{4} + 2k\pi$ or $x = \frac{3\pi}{4} + 2k\pi$, for any integer $k\}$
d. $\{x \mid x = \frac{\pi}{3} + 2k\pi$ or $x = \frac{2\pi}{3} + 2k\pi$, for any integer $k\}$

_____ **15.** **Find all values of α in [0°, 360°) that satisfy $2\sin 2x = 1$.**

a. 15°, 75°
b. 30°, 150°
c. 30°, 60°, 210°, 240°
d. 15°, 75°, 195°, 255°

_____ **16.** **Find all real numbers in the interval $[0, 2\pi)$ that satisfy: $2\sin^2 x + \sin x = 1$.**

a. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$ b. $0, \frac{\pi}{2}, \pi, 2\pi$ c. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{3\pi}{2}$ d. $\frac{1}{2}$

_____ **17.** **If $\cos\theta = -\frac{3}{4}$ and θ is in the second quadrant, then find $\sin\theta$.**

a. $\frac{\sqrt{7}}{4}$ b. $-\frac{\sqrt{7}}{4}$ c. $\frac{3}{5}$ d. $\frac{\sqrt{5}}{4}$

_____ **18.** **Find all values of θ in [0°, 360°) such that $\csc x = 2$.**
a. 60°, 120° b. 30°, 150° c. 30°, 210° d. No solutions

_____ **19.** **If $\sin\left(\frac{\pi}{2} - \alpha\right) = -\frac{4}{5}$ and $\pi < \alpha < \frac{3\pi}{2}$, then find $\cos\alpha$.**

a. $\frac{4}{5}$ b. $-\frac{3}{5}$ c. $\frac{3}{4}$ d. $-\frac{4}{5}$

_____ **20.** **Use identities to simplify: $\sin^2\left(\frac{\pi}{2} - \alpha\right) - \cos^2\left(\frac{\pi}{2} - \alpha\right)$.**
a. 0 b. $\cos 2\alpha$ c. 1 d. $\sin 2\alpha$

 Name: ________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **Use identities to simplify: $\cot\theta \cdot \cos\theta + \sin\theta$.**

a. $\cot\theta$ b. $\csc\theta$ c. $2\sin\theta$ d. $\cos^2\theta + 1$

_____ **2.** **Use identities to simplify: $\frac{\csc\theta}{\cot\theta + \tan\theta}$.**

a. $2\sec\theta$ b. $\sec\theta$ c. $\cos\theta$ d. $\sin\theta$

_____ **3.** **Discuss the symmetry of the graph of $f(x) = x + \sin x$.**

a. Symmetric to the x-axis c. Symmetric to the y-axis
b. Symmetric to the origin d. No symmetry

_____ **4.** **Factor completely: $2\sin^2\theta - \sin\theta - 3$.**

a. $(2\sin\theta - 3)(\sin\theta + 1)$ c. $\sin\theta\,(2\sin\theta - 1) - 3$
b. $(\sin\theta - 3)(2\sin\theta + 1)$ d. $2(\sin\theta - 3)(\sin\theta + 1)$

_____ **5.** **Which of the following are identities?**

A. $\frac{-\sin(-\alpha)}{\cos(-\alpha)} = \tan\alpha$ **C.** $(\sin x + 1)^2 + \cos^2 x = 2$

B. $\sec\theta - \sin\theta\cdot\tan\theta = \cos\theta$ **D.** $\frac{\sin\theta + \cos\theta}{\cos\theta} = \tan\theta + 1$

a. B, D b. A, B, D c. A, B, C d. All are identities

_____ **6.** **Find the exact value of cos 345°.**

a. $\frac{\sqrt{6}-\sqrt{2}}{4}$ b. $\frac{1-\sqrt{3}}{2}$ c. $\frac{\sqrt{2}+\sqrt{6}}{4}$ d. $-\frac{\sqrt{2}}{2}$

_____ **7.** **If $\sin\alpha = \frac{3}{5}$, $\sin\beta = \frac{5}{13}$, α in quadrant I, and β in quadrant II, find $\sin(\alpha + \beta)$.**

a. $-\frac{56}{65}$ b. $-\frac{16}{65}$ c. $\frac{24}{65}$ d. $\frac{56}{65}$

_____ **8.** **Simplify: $\frac{\tan 13° + \tan 17°}{1 - \tan 13° \tan 17°}$.**

a. $\frac{\sqrt{3}}{3}$ b. $\sqrt{3}$ c. tan 4° d. tan 221°

_____ **9.** **Find $\cos 2\theta$ if $\sin\theta = \frac{5}{13}$ and θ is in quadrant II.**

a. $\frac{119}{169}$ b. $\frac{10}{13}$ c. $-\frac{10}{13}$ d. $-\frac{119}{69}$

_____ **10.** **Write as a single trigonometric function: 4 cos $x \cdot$ sin$^3 x$ + 4 sin $x \cdot$ cos$^3 x$.**

a. $2 \sin 2x$ b. $\sin 2x$ c. $4(\sin 2x)^4$ d. $4 \sin^4 x \cdot \cos^4 x$

_____ **11.** **If cos $\theta = -\frac{3}{4}$ and θ is in quadrant II, find cos $\frac{\theta}{2}$.**

a. $\frac{\sqrt{2}}{4}$ b. $-\frac{3}{8}$ c. $\frac{7\sqrt{2}}{4}$ d. $-\frac{\sqrt{2}}{4}$

_____ **12.** **Find the exact value of cos(112.5°) · sin(67.5°).**

a. $\frac{\sqrt{2}}{4}$ b. -0.35 c. $-\frac{\sqrt{2}}{4}$ d. -1

_____ **13.** **Rewrite sin x + cos x in the form A sin$(x + c)$.**

a. $2\sin\left(x - \frac{\pi}{4}\right)$ b. $\sin(x + 1)$ c. $\sqrt{2}\sin\left(x + \frac{\pi}{4}\right)$ d. $\sin\left(x + \frac{\pi}{4}\right)$

_____ **14.** **Find all real numbers which solve the equation csc $x = 2$.**

a. $\{x \mid x = \frac{\pi}{3} + 2k\pi$ or $x = \frac{2\pi}{3} + 2k\pi$, for any integer $k\}$
b. $\{x \mid x = \frac{\pi}{6} + 2k\pi$ or $x = \frac{11\pi}{6} + 2k\pi$, for any integer $k\}$
c. $\{x \mid x = \frac{\pi}{4} + 2k\pi$ or $x = \frac{3\pi}{4} + 2k\pi$, for any integer $k\}$
d. $\{x \mid x = \frac{\pi}{6} + 2k\pi$ or $x = \frac{5\pi}{6} + 2k\pi$, for any integer $k\}$

_____ **15.** **Find all values of α in [0°, 360°] that satisfy $2\cos 2x = 1$.**

a. 30°, 150°, 210°, 330° c. 30°, 60°, 210°, 240°
b. 30°, 150° d. 15°, 75°, 195°, 255°

_____ **16.** **Find all real numbers in the interval [0, 2π) that satisfy 2 sin$^2 x$ + sin $x = 1$.**

a. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{\pi}{2}$ b. $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$ c. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{3\pi}{2}$ d. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$

_____ **17.** **If cos $\theta = -\frac{3}{4}$ and θ is in the third quadrant, then find sin θ.**

a. $\frac{\sqrt{7}}{4}$ b. $-\frac{\sqrt{7}}{4}$ c. $\frac{3}{5}$ d. $\frac{\sqrt{5}}{4}$

_____ **18.** **Find all values of θ in [0°, 360°) such that sec $x = 2$.**
a. 60°, 120° b. 30°, 150° c. 60°, 300° d. No solutions

_____ **19.** **If sin$\left(\frac{\pi}{2} - \alpha\right) = -\frac{4}{5}$ and $\pi < \alpha < \frac{3\pi}{2}$, then find cos α.**

a. $-\frac{4}{5}$ b. $-\frac{3}{5}$ c. $\frac{3}{4}$ d. $\frac{4}{5}$

_____ **20.** **Use identities to simplify: sin$^2\left(\frac{\pi}{2} - \alpha\right)$ − cos$^2\left(\frac{\pi}{2} - \alpha\right)$.**
a. $-\cos 2\alpha$ b. $\sin 2\alpha$ c. 1 d. $\cos 2\alpha$

Chapter 7 Test -- Form A Name: ________________________

Determine the number of triangles with the given parts and solve each triangle.

1. $a = 12, b = 31,\ \alpha = 20.5°$

2. $a = 8,\ c = 6,\ \gamma = 72°$

1. ________________________

2. ________________________

Find the magnitude and direction angle for each of the following vectors.

3. $\mathbf{A} + 2\mathbf{B}$
where $\mathbf{A} = \langle 2, 1\rangle$ and $\mathbf{B} = \langle -1, 4\rangle$

4. $\mathbf{v} = \mathbf{i} - 3\mathbf{j}$
where $\mathbf{i} = \langle 1, 0\rangle$ and $\mathbf{j} = \langle 0, 1\rangle$

3. ________________________

4. ________________________

Write each complex number in trigonometric form, using degree measure for the argument.

5. $3\sqrt{3} + 3i$

6. $-3i$

5. ________________________

6. ________________________

Perform the indicated operations. Write the answer in the form $a + bi$.

7. $8(\cos 85° + i \sin 85°) \cdot 2(\cos 95° + i \sin 95°)$

8. $\left(1 - i\sqrt{3}\right)^9$

7. ____________________

8. ____________________

Give the rectangular coordinates for each of the following points in the polar coordinate system.

9. $(4, 60°)$

10. $\left(-2, \frac{3\pi}{4}\right)$

9. ________________________

10. ________________________

Sketch the graph of each.

11. Polar: $r \cos \theta = 2$

12. Parametric: $x = t - 1, y = 2t$,
for $-2 \leq t \leq 3$

Solve each problem.

13. Find all cube roots of $-2 + 2i$. Leave answers in trigonometric form.

13. ____

14. Find the area of a triangle with sides of 7, 8, and 9 inches. Round to the nearest tenth of a square inch.

14. ____________________

15. Write an equation equivalent to $(x - 2)^2 + y^2 = 4$ in polar coordinates. Solve for r.

15. ____________________

16. The bearing of an airplane is 315° with an air speed of 500 mph. If the wind is blowing at a bearing of 60° at 25 mph, find the ground speed and the bearing of the course.

16. ____________________

Determine the number of triangles with the given parts and solve each triangle.

1. $a = 7,\ c = 5,\ \gamma = 72°$

2. $a = 12, b = 30,\ \alpha = 20.5°$

1. ______________________

2. ______________________

Find the magnitude and direction angle for each of the following vectors.

3. $\mathbf{A} + 2\mathbf{B}$
where $\mathbf{A} = \langle -2, 3\rangle$ and $\mathbf{B} = \langle 1, 4\rangle$

4. $\mathbf{v} = 2\mathbf{i} - \mathbf{j}$
where $\mathbf{i} = \langle 1, 0\rangle$ and $\mathbf{j} = \langle 0, 1\rangle$

3. ______________________

4. ______________________

Write each complex number in trigonometric form, using degree measure for the argument.

5. $2\sqrt{3} - 2i$

6. $5i$

5. ______________________

6. ______________________

Perform the indicated operations. Write the answer in the form $a + bi$.

7. $3(\cos 85° + i \sin 85°) \cdot 2(\cos 185° + i \sin 185°)$

8. $(1 - i)^8$

7. ______________________

8. ______________________

Give the rectangular coordinates for each of the following points in the polar coordinate system.

9. $(-2, 60°)$

10. $\left(2, \frac{5\pi}{4}\right)$

9. ______________________

10. ______________________

Sketch the graph of each.

11. Polar: $r \sin \theta = 2$

12. Parametric: $x = 3 - t, y = t + 2$, for $-2 \leq t \leq 3$

Solve each problem.

13. Find all cube roots of $-2\sqrt{3} + 2i$. Leave answers in trigonometric form.

13. ______________________________

14. Find the area of a triangle with sides of 9, 10, and 11 inches. Round to the nearest tenth of a square inch.

14. ______________________________

15. Write an equation equivalent to $x^2 + (y + 1)^2 = 1$ in polar coordinates. Solve for r.

15. ______________________________

16. The bearing of an airplane is 315° with an air speed of 500 mph. If the wind is blowing at a bearing of 30° at 20 mph, find the ground speed and the bearing of the course.

16. ______________________________

Name: ____________________

Determine the number of triangles with the given parts and solve each triangle.

1. $\alpha = 72.3°$, $\gamma = 121.4°$, $a = 14.2$

2. $a = 20$, $b = 22$, $\alpha = 62°$

1. ____________________

2. ____________________

Find the magnitude and direction angle for each of the following vectors.

3. 2**B**, where **B** = $\langle 4, 3 \rangle$

4. **A** − **B**,
where **A** = $\langle 2\sqrt{3}, 1 \rangle$, **B** = $\langle \sqrt{3}, 2 \rangle$

3. ____________________

4. ____________________

Write each complex number in trigonometric form, using degree measure for the argument.

5. $\sqrt{2} - \sqrt{2}i$

6. $-5 + 0i$

5. ____________________

6. ____________________

Perform the indicated operations. Write the answer in the form $a + bi$.

7. $\frac{4(\cos \pi + i \sin \pi)}{2\left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}\right)}$

8. $(1 - i)^{12}$

7. ____________________

8. ____________________

Give the rectangular coordinates for each of the following points in the polar coordinate system. Round approximations to four significant digits.

9. $\left(2, -\frac{\pi}{4}\right)$

10. $(-3, 125°)$

9. ____________________

10. ____________________

Sketch the graph of each.

11. Polar: $r = \frac{3}{\sin\theta}$

12. Parametric: $x = 2t - 1, y = t + 2$, for $-2 \le t \le 3$

Solve each problem.

13. Find all square roots of $\frac{1}{2} - \frac{\sqrt{3}}{2}i$. Leave answers in trigonometric form.

13. ____

14. A car crosses an intersection traveling at 52 mph. At exactly the same time, a truck is on the intersecting road two miles from the point of intersection, traveling at 60 mph away from the intersection. The angle between the roads on which the vehicles are traveling is 50°. If the car and truck maintain their speeds, how far apart are they after 15 minutes? Round answer to the nearest tenth of a mile.

14. ______________________________

15. Write an equation equivalent to $(x-1)^2 + (y+2)^2 = 5$ in polar coordinates. Solve for r.

15. ______________________________

16. Find the magnitude of the resultant force if forces of 2 pounds and 6 pounds act upon an object at an angle of 40° to each other. Round to the nearest tenth of a pound.

16. ______________________________

Chapter 7 Test -- Form D **Name:** ______________________

Determine the number of triangles with the given parts and solve each triangle.

1. $b = 4.0$, $c = 4.1$, $\beta = 65°$

2. $a = 8$, $b = 16$, $\alpha = 30°$

1. ______________________

2. ______________________

Find the magnitude and direction angle for each of the following vectors.

3. $\langle 2, -2 \rangle$

4. $\mathbf{A} + \mathbf{B}$, where $\mathbf{A} = \langle 2\sqrt{3}, 1 \rangle$, $\mathbf{B} = \langle \sqrt{3}, 2 \rangle$

3. ______________________

4. ______________________

Write each complex number in trigonometric form, using degree measure for the argument.

5. $-2 - 2\sqrt{3}\,i$

6. $-7 + 0i$

5. ______________________

6. ______________________

Perform the indicated operations. Write the answer in the form $a + bi$.

7. $\dfrac{14\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)}{2\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)}$

8. $\left(-1 + \sqrt{3}\,i\right)^{12}$

7. ______________________

8. ______________________

Give the rectangular coordinates for each of the following points in the polar coordinate system. Round approximations to four significant digits.

9. $\left(\frac{3}{2}, -30°\right)$

10. $\left(2, \frac{3\pi}{5}\right)$

9. ______________________

10. ______________________

Sketch the graph of each.

11. Polar: $r = -4 \sin\theta$

12. Parametric: $x = t - 1, y = 2t - 1$, for $-2 \leq t \leq 3$

Solve each problem.

13. Find all square roots of $-\sqrt{3} - i$. Leave answers in trigonometric form.

13. ______________________________

14. A car crosses an intersection traveling at 52 mph. At exactly the same time, a truck is on the intersecting road two miles from the point of intersection, traveling at 60 mph away from the intersection. The angle between the roads on which the vehicles are traveling is 55°. If the car and truck maintain their speeds, how far apart are they after 15 minutes? Round answer to the nearest tenth of a mile.

14. ______________________________

15. Write an equation equivalent to $y = \frac{1}{2}x^2$ in polar coordinates. Solve for r.

15. ______________________________

16. Find a pair of parametric equations whose graph is the line segment joining $(-3, 1)$ and $(2, 5)$, for t in the interval $[0,\ 2]$.

16. ______________________________

Chapter 7 Test -- Form E Name: ______________________

Multiple Choice: Choose the best answer for each problem.

_____ 1. **Find all possible values for β in a triangle with these given parts:**
$\alpha = 65°$, $a = 6.5$, $b = 7$.

a. 52.8°, 127.2° b. 57.3°, 122.7° c. 77.4°, 102.6° d. 25°, 155°

_____ 2. **Students on a hike were told to first walk 250 yards from the starting point in the direction N32°E. Then, they were to walk in the direction N62°W until they came to a hollow tree. From the hollow tree, they could walk due South to return to their starting point. How far did the students walk on the second leg of their trail?**

a. 132.8 yards b. 137.8 yards c. 132.5 yards d. 150 yards

_____ 3. **Find the area of a triangle whose sides have lengths of 7, 8, and 9 feet.**
a. 28 sq. ft b. 24 sq. ft c. 26.8 sq. ft d. 312.9 sq. ft

_____ 4. **Two trains leave the same train station at exactly the same moment. One train travels northeast at 50 mph. The other train travels due west at 40 mph. How far apart are the trains after 2 hours?**

a. 166.5 miles b. 71.3 miles c. 35.7 miles d. 83.2 miles

_____ 5. **Find the component form for vector v if $|\mathbf{v}| = 3$ with direction angle 210°.**

a. $\left\langle -\frac{3\sqrt{3}}{2}, -\frac{3}{2} \right\rangle$ b. $\left\langle -\frac{3}{2}, -\frac{3\sqrt{3}}{2} \right\rangle$ c. $\left\langle \frac{3}{2}, \frac{3\sqrt{3}}{2} \right\rangle$ d. $\left\langle \frac{3\sqrt{3}}{2}, \frac{3}{2} \right\rangle$

_____ 6. **If $\mathbf{A} = \langle 2\sqrt{3}, 2 \rangle$ and $\mathbf{B} = \langle \sqrt{3}, -1 \rangle$, find the direction angle for $\mathbf{A} - 2\mathbf{B}$.**

a. 60° b. 0° c. 30° d. 90°

_____ 7. **Find the absolute value of $2\sqrt{3} - 2i$.**

a. 4 b. $\sqrt{3}$ c. $2\sqrt{3} + 2i$ d. $2\sqrt{3} + 2$

_____ 8. **Find the product and write the answer in trigonometric form:**
$\sqrt{3}\,(\cos 30° + i \sin 30°) \cdot 2\,(\cos 45° + i \sin 45°)$

a. $2\sqrt{3}\,(\cos 15° + i \sin 15°)$
b. $2\sqrt{3}\,(\cos 1350° + i \sin 1350°)$
c. $\sqrt{3}\,(\cos 2700° + i \sin 2700°)$
d. $2\sqrt{3}\,(\cos 75° + i \sin 75°)$

_____ 9. **Simplify and write in the form $a + bi$: $[2\,(\cos 135° + i \sin 135°)]^4$.**

a. $16 + 16i$ b. $-8\sqrt{2} + 4$ c. $-8\sqrt{2} - 8\sqrt{2}i$ d. $-16 + 0i$

_____ **10.** **Find $\frac{z}{w}$ in trigonometric form for $z = 4 + 4i$ and $w = 2 + 2i\sqrt{3}$.**

a. $\sqrt{2}\,(\cos 345° + i \sin 345°)$
b. $2\sqrt{2}\,(\cos 315° + i \sin 315°)$
c. $\sqrt{2}\,(\cos 255° + i \sin 255°)$
d. $\sqrt{2}\,(\cos 15° + i \sin 15°)$

_____ **11.** **Find the square roots of 9(cos 144° + i sin 144°).**

a. $3\,(\cos 72° + i \sin 72°)$
$3\,(\cos 252° + i \sin 252°)$

b. $3\,(\cos 144° + i \sin 144°)$
$3\,(\cos 324° + i \sin 324°)$

c. $81\,(\cos 288° + i \sin 288°)$
$81\,(\cos 108° + i \sin 108°)$

d. $3\,(\cos 12° + i \sin 12°)$
$3\,(\cos 192° + i \sin 192°)$

_____ **12.** **Which of the following is a solution to the equation $x^3 - 2 = 0$?**

a. $\sqrt[3]{2}\left(-\frac{\sqrt{3}}{2} + i\,\frac{1}{2}\right)$
b. $\sqrt[3]{2}\left(\frac{\sqrt{3}}{2} + i\,\frac{1}{2}\right)$
c. $\sqrt[3]{2}\left(-\frac{1}{2} + i\,\frac{\sqrt{3}}{2}\right)$
d. $\sqrt[3]{2}\left(-\frac{\sqrt{2}}{2} + i\,\frac{\sqrt{2}}{2}\right)$

_____ **13.** **Convert the rectangular equation to a polar equation: $(x-1)^2 + y^2 = 1$.**

a. $r = 2 \sin \theta$ b. $r = 2 \cos \theta$ c. $r^2 = 1$ d. $r = 2 + \cos \theta$

_____ **14.** **Write a rectangular equation for: $r = 3 \csc \theta$.**

a. $x^2 + y^2 = \frac{3}{y}$ b. $x^2 + y^2 = 3$ c. $x^2 + y^2 = 3y$ d. $y = 3$

_____ **15.** **The graph of $r = 2 \cos \theta$ is in the shape of a:**

a. vertical line b. horizontal line c. circle d. four-leaf rose

_____ **16.** **Write $0 - 2i$ in trigonometric form.**

a. $2\left(\cos \frac{3\pi}{2} + i \sin \frac{3\pi}{2}\right)$
b. $2(\cos \pi + i \sin \pi)$
c. $-2\left(\cos \frac{3\pi}{2} + i \sin \frac{3\pi}{2}\right)$
d. $2\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)$

_____ **17.** **Convert the polar coordinates (10, 30°) to rectangular coordinates.**

a. $\left(5\sqrt{3}, 5\right)$ b. $\left(5, 5\sqrt{3}\right)$ c. $\left(5\sqrt{2}, 5\right)$ d. $\left(\frac{3\sqrt{2}}{2}, \frac{1}{2}\right)$

_____ **18.** **The bearing of an airplane is 315° with an air speed of 500 mph. If the wind is blowing at a bearing of 60° at 25 mph, find the bearing of the actual course of the plane.**

a. 321.5° b. 317.8° c. 15° d. 255°

 Name: ________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **Find all possible values for β in a triangle with these given parts:**
$\alpha = 50°$, $a = 3.2$, $b = 3.8$.

a. 40.2°, 139.8° b. 40.2° c. 65.5° d. 65.5°, 114.5°

_____ **2.** **Find the area of a triangle whose sides have lengths of 10 ft, 11 ft, and 12 ft.**

a. 51.5 sq. ft b. 55 sq. ft c. 66 sq. ft d. 592 sq. ft

_____ **3.** **Find the component form for vector v if $|\mathbf{v}| = 3$ with direction angle 330°.**

a. $\left\langle -\frac{3\sqrt{3}}{2}, -\frac{3}{2} \right\rangle$ b. $\left\langle -\frac{3}{2}, -\frac{3\sqrt{3}}{2} \right\rangle$ c. $\left\langle \frac{3}{2}, -\frac{3\sqrt{3}}{2} \right\rangle$ d. $\left\langle \frac{3\sqrt{3}}{2}, -\frac{3}{2} \right\rangle$

_____ **4.** **If $\mathbf{A} = \langle 1, \sqrt{3} \rangle$ and $\mathbf{B} = \langle -1, -\sqrt{3} \rangle$, find the direction angle for $2\mathbf{A} + \mathbf{B}$.**

a. 60° b. 0° c. 30° d. 90°

_____ **5.** **Find the magnitude of the resultant force if forces of 2 pounds and 6 pounds act upon an object at an angle of 40° to each other. Round to the nearest tenth of a pound.**

a. 7.6 lbs b. 4.6 lbs c. 58.4 lbs d. 12.4 lbs

_____ **6.** **Find the absolute value of $1 - i$.**

a. $1 + i$ b. 2 c. $\sqrt{2}$ d. 1

_____ **7.** **Find the product and write the answer in trigonometric form:**
$\sqrt{2}\,(\cos 120° + i \sin 120°) \cdot 2\sqrt{2}\,(\cos 45° + i \sin 45°)$

a. $4\,(\cos 5400° + i \sin 5400°)$ c. $2\,(\cos 85° + i \sin 85°)$

b. $4\,(\cos 165° + i \sin 165°)$ d. $4\,(\cos 85° + i \sin 85°)$

_____ **8.** **Find $\frac{z}{w}$ in trigonometric form for $z = 4 - 4i$ and $w = 2 + 2i\sqrt{3}$.**

a. $\sqrt{2}\,(\cos 15° + i \sin 15°)$ c. $2\sqrt{2}\,(\cos 315° + i \sin 315°)$

b. $\sqrt{2}\,(\cos 255° + i \sin 255°)$ d. $2\sqrt{2}\,(\cos 255° + i \sin 255°)$

_____ **9.** **Simplify and write in the form $a + bi$: $[2\,(\cos 135° + i \sin 135°)]^4$.**

a. $-16 + 0i$ b. $-2\sqrt{2} - 2\sqrt{2}i$ c. $-2\sqrt{2} + i$ d. $16 + 16i$

_____ **10.** **Find the square roots of 9(cos 108° + i sin 108°).**

a. 3 (cos 216° + i sin 216°)
3 (cos 36° + i sin 36°)

b. 3 (cos 54° + i sin 54°)
3 (cos 234° + i sin 234°)

c. 81 (cos 288° + i sin 288°)
81 (cos 108° + i sin 108°)

d. 18 (cos 72° + i sin 72°)
18 (cos 252° + i sin 252°)

_____ **11.** **Which of the following is a solution to the equation $x^3 + 2 = 0$?**

a. $-\sqrt[3]{2}\left(-\frac{\sqrt{3}}{2} + i\,\frac{1}{2}\right)$

b. $\sqrt[3]{2}\left(\frac{\sqrt{3}}{2} - i\,\frac{1}{2}\right)$

c. $\sqrt[3]{2}\left(\frac{1}{2} - i\,\frac{\sqrt{3}}{2}\right)$

d. $-\sqrt[3]{2}\left(-\frac{\sqrt{2}}{2} + i\,\frac{\sqrt{2}}{2}\right)$

_____ **12.** **Which pair of polar coordinates represents the same point?**

A. $\left(2, \frac{\pi}{4}\right), \left(-2, -\frac{\pi}{4}\right)$ **B.** $\left(\sqrt{3}, -\frac{3\pi}{4}\right), \left(-\sqrt{3}, \frac{5\pi}{4}\right)$

C. $\left(-1, -\frac{2\pi}{3}\right), \left(-1, \frac{\pi}{3}\right)$

a. A only b. B only c. C only d. None

_____ **13.** **Convert the rectangular equation to a polar equation:** $x^2 + (y - 1)^2 = 1$.

a. $r = 2\sin\theta$ b. $r = 2\cos\theta$ c. $r^2 = 1$ d. $r = 2 + \cos\theta$

_____ **14.** **Write a rectangular equation for** $r = 3\sec\theta$**.**

a. $x^2 + y^2 = \frac{1}{3x}$ b. $y = 3$ c. $x^2 + y^2 = 3y$ d. $x = 3$

_____ **15.** **The graph of** $r = 2\cos\theta$ **is in the shape of a:**

a. circle b. vertical line c. horizontal line d. four-leaf rose

_____ **16.** **Write** $0 - 2i$ **in trigonometric form.**

a. $-2\left(\cos\frac{3\pi}{2} + i\sin\frac{3\pi}{2}\right)$

b. $2\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$

c. $2\left(\cos\frac{3\pi}{2} + i\sin\frac{3\pi}{2}\right)$

d. $2(\cos\pi + i\sin\pi)$

_____ **17.** **Convert the polar coordinates (10, 60°) to rectangular coordinates.**

a. $(5\sqrt{3}, 5)$ b. $(5, 5\sqrt{3})$ c. $(5\sqrt{2}, 5)$ d. $\left(\frac{3\sqrt{2}}{2}, \frac{1}{2}\right)$

_____ **18.** **Find a pair of parametric equations whose graph is the line segment joining** $(-1, 5)$ **and** $(8, 11)$**, for t in the interval** $[0, 2]$**.**

a. $x = -t + 8,\ y = 5t + 11$

b. $x = \frac{9}{2}t - 1,\ y = 3t + 5$

c. $x = 3t - 1,\ y = 2t + 5$

d. $x = \frac{3}{8}t + \frac{3}{8},\ y = \frac{1}{2}t - \frac{5}{2}$

Name: ______________________

Solve each system by the indicated method.

1. Graphing: $\begin{cases} 2x + 3y = -3 \\ 3x - \frac{1}{2}y = \frac{1}{2} \end{cases}$

1. ____________

2. Substitution: $\begin{cases} 3x + y = 3 \\ 2x + 4y = 7 \end{cases}$

2. ____________

3. Addition: $\begin{cases} 2x - 5y = -8 \\ 3x + 2y = 7 \end{cases}$

3. ____________

Determine whether each of the following systems is independent, inconsistent, or dependent.

4. $\begin{cases} 4x - 2y = 8 \\ x - \frac{1}{2}y = 2 \end{cases}$

5. $\begin{cases} \frac{x}{2} + \frac{y}{3} = 1 \\ \frac{x}{3} + \frac{y}{4} = -2 \end{cases}$

4. __________________

5. __________________

Find the solution set to each system of equations.

6. $\begin{cases} x + y + z = 6 \\ 2x - y + z = 3 \\ x + 2y - 3z = -4 \end{cases}$

7. $\begin{cases} x + 2y = 7 \\ xy = 6 \end{cases}$

6. ____________________

7. ____________________

Graph the solution set to each inequality or system of inequalities.

8. $y < x^2 + 1$

9. $\begin{cases} x + y < 2 \\ y \geq x + 1 \end{cases}$

Solve each problem.

10. Find the partial fraction decomposition for the rational expression: $\frac{x^2+4}{x^2(x^2+1)}$.

10. ____________________________________

11. In three years, Lacey will be twice as old as Jennifer will be. At present, twice Lacey's age is the same as the product of Rachel's and Jennifer's ages. If Rachel is now twice as old as Jennifer, find the ages of all three girls.

11. ____________________________________

 Name: ________________________

Solve each system by the indicated method.

1. Graphing: $\begin{cases} x + y = 4 \\ 2x - 3y = 3 \end{cases}$

1. ____________

2. Substitution: $\begin{cases} 4x - 2y = -1 \\ 3x + y = 3 \end{cases}$

2. ____________

3. Addition: $\begin{cases} 2x + 5y = 5 \\ \frac{1}{2}x - \frac{1}{4}y = \frac{11}{4} \end{cases}$

3. ____________

Determine whether each of the following systems is independent, inconsistent, or dependent.

4. $\begin{cases} 3x + 2y = 6 \\ \frac{x}{2} + \frac{y}{3} = -1 \end{cases}$

5. $\begin{cases} 5x - 2y = \frac{1}{2} \\ \frac{1}{5}x - \frac{1}{2}y = 2 \end{cases}$

4. ____________________

5. ____________________

Find the solution set to each system of equations.

6. $\begin{cases} x + y + z = 3 \\ 2x - y + z = 3 \\ x + 2y - 3z = 4 \end{cases}$

7. $\begin{cases} x + 3y = 4 \\ xy = 1 \end{cases}$

6. ____________________ 7. ____________________

Graph the solution set to each inequality or system of inequalities.

8. $y \geq x^2 + 1$

9. $\begin{cases} x + y > 2 \\ y \leq x + 1 \end{cases}$

Solve each problem.

10. Find the partial fraction decomposition for the rational expression: $\frac{5x^2 - 10x + 3}{x^3 - 3x^2}$.

10. ______________________________

11. In three years, Lacey will be twice as old as Jennifer will be. At present, three times Lacey's age is the same as the product of Rachel's and Jennifer's ages. If Rachel is now three times as old as Jennifer, find the ages of all three girls.

11. ______________________________

Name: ________________________

Solve each system by the indicated method.

1. Graphing: $\begin{cases} 2x + 3y = -1 \\ x + 2y = 0 \end{cases}$

1. ____________

2. Substitution: $\begin{cases} 3x + y = 0 \\ 2x + 4y = 5 \end{cases}$

2. ____________

3. Addition: $\begin{cases} x - \frac{2}{3}y = \frac{7}{3} \\ \frac{4}{5}x + y = 8 \end{cases}$

3. ____________

Determine whether each of the following systems is independent, inconsistent, or dependent.

4. $\begin{cases} 2x - 6y = 5 \\ 5x - 15y = 2 \end{cases}$

5. $\begin{cases} 4x - y = 1 \\ 3x + 2y = 4 \end{cases}$

4. ____________________

5. ____________________

Find the solution set to each systems of equations.

6. $\begin{cases} 2x - y - z = -4 \\ 3x + 2y - z = -5 \\ x - 3y + 5z = 9 \end{cases}$

7. $\begin{cases} x^2 + y^2 = 25 \\ x + y = 7 \end{cases}$

6. ________________

7. ________________

Graph the solution set to each inequality or system of inequalities.

8. $y < 2 - x^2$

9. $\begin{cases} 2x + y < 4 \\ 3x - 2y \leq 6 \end{cases}$

Solve each problem.

10. Find the partial fraction decomposition for the rational expression: $\frac{2x^2 + 7x + 3}{x(x+1)^2}$.

10. ______________________________

11. Find the maximum value of $P(x, y) = x + 4y + 3$ subject to the constraints: $x \geq 0,\ y \geq 0,\ y \leq -2x + 4,\ y \leq -x + 3$.

11. ______________________________

Chapter 8 Test -- Form D **Name: ________________________**

Solve the systems by the indicated methods.

1. By Graphing: $\begin{cases} 3x - y = 3 \\ x + 2y = 1 \end{cases}$

1. ______________

2. By Substitution: $\begin{cases} 2x - y = 5 \\ 3x + 2y = 4 \end{cases}$

2. ______________

3. By Addition: $\begin{cases} \frac{1}{2}x + \frac{1}{3}y = 1 \\ \frac{1}{3}x - \frac{1}{2}y = -\frac{7}{9} \end{cases}$

3. ______________

4. Find the point of intersection of the vertical line through the point $(3, -4)$ and the line whose equation is $2x - 3y = 6$.

4. ______________

Find the solution set to each system of equations.

5. $\begin{cases} x - y - z = 3 \\ 3x - 2y + 2z = 5 \\ x + 3y + z = 5 \end{cases}$

6. $\begin{cases} x^2 + y^2 = 5 \\ 2x + y = 5 \end{cases}$

5. ________________

6. ________________

Solve each problem.

7. Graph the solution set to the inequality $y \geq x^2 - 1$.

8. Find the maximum value of $P(x, y) = 3x + 2y - 1$ subject to the constraints: $x \geq 0,\ y \geq 0,\ x + 2y \leq 6$.

8. ______________________________

9. Solve the system: $\begin{cases} x - 2y + 3z = 4 \\ 3x + y - z = 2 \end{cases}$

9. ______________________________

10. Given a linear system in three variables, what does its solution $(x,\ y,\ z)$ stand for graphically?

 Name:_________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **If two lines intersect in a single point, a system consisting of these two linear equations is:**

a. dependent b. independent c. inconsistent d.systematic

_____ **2.** **Find the point of intersection of the vertical line through the point $(3, -4)$ and the line whose equation is $2x - 3y = 6$.**

a. $(3, 0)$ b. $(3, -4)$ c. $(-3, -4)$ d. $(0, -2)$

_____ **3.** **A movie theater has different ticket prices for those under 12 years of age and those 12 or over. Martha and her two children, ages 6 and 8, paid \$15 to gain entrance to the theater. Mr. and Mrs. Sorbet and their 11-year old daughter got in for \$19.50. What is the ticket price for those over 12?**

a. \$5.00 b. \$5.90 c. \$6.50 d. \$8.00

_____ **4.** **A solution (x, y, z) to a linear system in three variables stands for:**

a. the intersection point of three lines
b. three points in space
c. the intersection point of three planes
d. a point where at two planes meet

_____ **5.** **Which of the following cannot occur if two planes appear in three-dimensional space?**

a. They can intersect in a single point.
b. They can intersect in a single line.
c. There can be infinitely many points which satisfy both equations representing the planes.
d. There can be no points which satisfy both equations representing the planes.

_____ **6.** **Solve the system:** $\begin{cases} x - 2y + 3z = 4 \\ 3x + y - z = 2 \end{cases}.$

a. $\{(x, 10 - 10x, 8 - 7x) \mid x \text{ is any real number}\}$
b. $\{(x, -4x - 7, 6 - 7x) \mid x \text{ is any real number}\}$
c. $\{(1, 0, 1)\}$
d. No solution

_____ **7.** **How many solutions can there be to a system that has one linear equation in two variables and one equation of the form $y = ax^2 + bx + c$?**

a. 1 or 2 b. 2 c. 0 d. 0, 1 or 2

_____ **8.** **Solve the system:** $\begin{cases} y = |5x - 6| \\ y = x^2 \end{cases}$.

a. $\{(2, 4), (3, 9)\}$
b. $\{(6, 36), (-1, 1)\}$
c. $\{(2, 4), (3, 9), (-6, 36), (1, 1)\}$
d. This is an inconsistent system.

_____ **9.** **Solve the system:** $\begin{cases} x + \frac{y}{2} = 7 \\ \frac{x}{3} - y = 7 \end{cases}$.

a. $\{(9, \ -4)\}$ b. $\{(2, 3)\}$ c. $\{(x, y) \mid 3x - 2y = 0\}$ d. $\{(-3, -2)\}$

_____ **10.** **Decompose into partial fractions:** $\frac{x^2+4}{x^2(x^2+1)}$.

a. $\frac{4}{x^2} + \frac{-3}{x^2+1}$
b. $1 + \frac{4}{x^2} + \frac{x^2+4}{x^2+1}$
c. $\frac{1}{x} + \frac{1}{x^2} + \frac{4x-3}{x^2+1}$
d. $\frac{1}{x^2+1} + \frac{4}{x^4+x^2}$

_____ **11.** **The process of finding partial fractions is used to:**

a. rewrite a fraction as its simpler factors.
b. take an irreducible quadratic in the denominator and decompose it.
c. reverse the process of addition of rational expressions.
d. give more practice using systems.

_____ **12.** **The main difference between the graph of a linear equation and the graph of a linear inequality is whether:**

a. we have many solutions or only one.
b. we shade a region or not.
c. we draw a solid or dashed line.
d. we have lines intersecting.

_____ **13.** **Find the maximum value of $P(x, y) = 3x + 2y - 1$ subject to the constraints: $x \geq 0$, $y \geq 0$, $x + 2y \leq 6$.**

a. 4 b. 5 c. 8 d. 17

_____ **14.** **A car company produces two versions of its new model of car, one is the XL and the other is the XLLtd. It takes 6 hours of construction to produce the XL and 9 hours of construction for the XLLtd. The finishing takes 3 hours for the XL and 6 hours for the XLLtd. The company has 90 hours of construction time allotted during a week and 48 hours of finishing time allotted. If the profit on an XL is $2300 and the profit on an XLLtd. is $3500, how many XL's and how many XLLtd.'s should be constructed and finished in one week to maximize profit ?**

a. 12 XL's, 2 XLLtd.'s
b. 10 XL's, 6 XLLtd.'s
c. 10 XL's, 12 XLLtd.'s
d. 15 XL's, 0 XLLtd.'s

 Name:________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **If two lines intersect in a single point, a system consisting of these two linear equations is:**

a. dependent b. inconsistent c. independent d.systematic

_____ **2.** **Find the point of intersection of the horizontal line through the point $(3, -2)$ and the line whose equation is $2x - 3y = 6$.**

a. $(3, 0)$ b. $(3, -4)$ c. $(-3, -2)$ d. $(0, -2)$

_____ **3.** **A movie theater has different ticket prices for those under 12 years of age and those 12 or over. Martha and her two children, ages 6 and 8, paid $15 to gain entrance to the theater. Mr. and Mrs. Sorbet and their 11-year old daughter got in for $19.50. What is the ticket price for those under 12?**

a. $3.50 b. $3.75 c. $5.00 d. $8.00

_____ **4.** **The solution (x, y, z) to a linear system in three variables stands for:**

a. a point where two planes meet
b. three points in space
c. the intersection point of three lines
d. the intersection point of three planes

_____ **5.** **Which of the following cannot occur if two planes appear in three-dimensional space?**

a. They can intersect in a single line.
b. They can intersect in a single point.
c. There can be infinitely many points which satisfy both equations representing the planes.
d. There can be no points which satisfy both equations representing the planes.

_____ **6.** **Solve the system:** $\begin{cases} x - 2y + 3z = 4 \\ 3x + y - z = 2 \end{cases}$.

a. $\{(x, -4x - 7, 6 - 7x) \mid x$ is any real number$\}$
b. $\{(x, 10 - 10x, 8 - 7x) \mid x$ is any real number$\}$
c. $\{(1, 0, 1)\}$
d. No solution

_____ **7.** **How many solutions can there be to a system that has one linear equation in two variables and one equation of the form $y = ax^2 + bx + c$?**

a. 0, 1 or 2 b. 2 c. 0 d. 1 or 2

_____ **8.** **Solve the system:** $\begin{cases} x + y = 7 \\ x^2 + y^2 = 25 \end{cases}$.

a. $\{(4, 3)\}$
b. $\{(3, 4), (4, 3)\}$
c. $\{(4, -3), (-4, -3), (3, 4), (-3, -4)\}$
d. This is an inconsistent system.

_____ **9.** **Solve the system:** $\begin{cases} x + \frac{y}{2} = 3 \\ \frac{x}{3} - y = 1 \end{cases}$.

a. $\{(2, 2)\}$ b. $\{(3, 0)\}$ c. $\{(x, y) \mid 3x - 4y = 4\}$ d. $\{(3, 2)\}$

_____ **10.** **Decompose into partial fractions:** $\frac{x^2+4}{x^2(x^2+1)}$ **.**

a. $\frac{1}{x^2+1} + \frac{4}{x^4+x^2}$
b. $1 + \frac{4}{x^2} + \frac{x^2+4}{x^2+1}$
c. $\frac{1}{x} + \frac{1}{x^2} + \frac{4x-3}{x^2+1}$
d. $\frac{4}{x^2} + \frac{-3}{x^2+1}$

_____ **11.** **The process of finding partial fractions is used to:**

a. rewrite a fraction as its simpler factors.
b. reverse the process of addition of rational expressions.
c. take an irreducible quadratic in the denominator and decompose it.
d. give more practice using systems.

_____ **12.** **The main difference between the graph of a linear equation and the graph of a linear inequality is whether:**

a. we have many solutions or only one.
b. we draw a solid or dashed line.
c. we shade a region or not.
d. we have intersecting lines.

_____ **13.** **Find the maximum value of $P(x, y) = 12x + 15y$ subject to the constraints: $x \geq 0$, $y \geq 0$, $4x + 3y \leq 12$.**

a. 0 b. 36 c. 60 d. 96

_____ **14.** **A car company produces two versions of its new model of car -- one is the XL and the other is the XLLtd. It takes 6 hours of construction to produce the XL and 9 hours of construction for the XLLtd. The finishing takes 3 hours for the XL and 6 hours for the XLLtd. The company has 90 hours of construction time allotted during a week and 48 hours of finishing time allotted. If the profit on an XL is $2300 and the profit on an XLLtd. is $3500, how many XL's and how many XLLtd.'s should be constructed and finished in one week to maximize profit ?**

a. 10 XL's, 12 XLLtd.'s
b. 12 XL's, 2 XLLtd.'s
c. 10 XL's, 6 XLLtd.'s
d. 15 XL's, 0 XLLtd.'s

 Name:________________________

Solve each system, using Gaussian elimination.

1. $\begin{cases} 5x - y = 3 \\ -2x + 4y = 6 \end{cases}$

2. $\begin{cases} x + y + z = 6 \\ 2x - y + z = 3 \\ x + 2y - 3z = -4 \end{cases}$

1. ____________________

2. ____________________

Let A = $\begin{bmatrix} 2 & 4 \\ -1 & 0 \end{bmatrix}$, **B =** $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, **C =** $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$, **D =** $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$, **E =** $\begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$, **F =** $\begin{bmatrix} 2 & 0 & -2 \end{bmatrix}$,

and G = $\begin{bmatrix} 1 & 2 & 3 \\ -1 & 3 & 0 \\ -2 & 1 & 1 \end{bmatrix}$**. Find each of the following matrices or determinants, if possible.**

3. A + B

4. AC

5. G^{-1}

6. | A |

7. | G |

8. DB

9. 2C − D

10. FE

Solve each problem.

11. Solve the system using Cramer's Rule: $\begin{cases} 3x + 2y = 7 \\ 2x + y = 6 \end{cases}$.

11. ____________________

12. Find values of x and y that make the equation true: $\begin{bmatrix} 2 & 4 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 5 \end{bmatrix}$.

12. ____________________

13. Solve the system by using an inverse matrix: $\begin{cases} x - 3y = 2 \\ 2x + y = 11 \end{cases}$.

13. ____________________

14. Solve by using a matrix method: Chase, Jason, and Sean spent a total of $49 renting movies last month. Jason and Sean's expenditures totaled three-fourths of Chase's. If Sean spent $10 more than Jason, then how much did each spend?

14. ____________________

Chapter 9 Test -- Form B **Name:** ______________________

Solve each system by using the Gaussian elimination method.

1. $\begin{cases} 3x - y = 3 \\ x + 2y = 1 \end{cases}$

2. $\begin{cases} x - y - z = 3 \\ 3x - 2y - 2z = 5 \\ x + 3y + z = -1 \end{cases}$

1. ____________________ 2. ____________________

Let $A = \begin{bmatrix} 2 & 4 \\ -1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, $C = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$, $D = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$, $E = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$, $F = \begin{bmatrix} 2 & 0 & -2 \end{bmatrix}$,

and $G = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 3 & 0 \\ -2 & 1 & 1 \end{bmatrix}$**. Find each of the following matrices or determinants, if possible.**

3. A – B

4. CA

5. | G |

6. G^{-1}

7. | A |

8. BD

9. C + 2D

10. FE

Solve each problem.

11. Solve the system using Cramer's Rule: $\begin{cases} 3x - 2y = 7 \\ 4x + 5y = 40 \end{cases}$.

11. ____________________

12. Find values of x and y that make the equation true: $\begin{bmatrix} 3 & 2 \\ 6 & 10 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 9 \end{bmatrix}$.

12. ____________________

13. Solve the system by using an inverse matrix: $\begin{cases} 2x - 5y = -8 \\ 3x + 2y = 7 \end{cases}$.

13. ____________________

14. Solve by using a matrix method: Mary, Joan, and Katy spent a total of $49 renting movies last month. Mary and Katy's expenditures totaled three-fourths of Joan's. If Katy spent $10 more than Mary, then how much did each spend?

14. ____________________

 Name: ______________________

Solve each system by using the Gaussian elimination method.

1. $\begin{cases} 3x + y = 0 \\ 2x + 4y = 5 \end{cases}$

2. $\begin{cases} 2x - y - z = -4 \\ 3x - 2y - z = -5 \\ x - 3y + 5z = 9 \end{cases}$

1. ____________________

2. ____________________

Let A = $\begin{bmatrix} 1 & 5 \\ -2 & 4 \end{bmatrix}$, **B =** $\begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$, **C =** $\begin{bmatrix} 4 \\ 3 \end{bmatrix}$, **D =** $\begin{bmatrix} -2 \\ 1 \end{bmatrix}$, **E =** $\begin{bmatrix} 3 \\ -1 \\ -2 \end{bmatrix}$,

F = $[1 \quad 0 \quad -2]$ **,and G =** $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & 1 \\ 2 & -1 & 4 \end{bmatrix}$. **Find each of the following matrices or determinants, if possible.**

3. A + B

4. AC

5. G^{-1}

6. | B |

7. | G |

8. DB

9. 2C − D

10. FE

Solve each problem.

11. Solve the system using Cramer's Rule: $\begin{cases} 4x - y = 1 \\ 3x + 2y = 4 \end{cases}$.

11. ______________________

12. Find values of x and y that make the equation true: $\begin{bmatrix} 3 & 2 \\ 6 & 9 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 15 \end{bmatrix}$.

12. ______________________

13. Solve the system by using an inverse matrix: $\begin{cases} x - y = 4 \\ 3x + 2y = 17 \end{cases}$.

13. ______________________

14. Solve by using a matrix method: Luke, Kim, and Joe spent a total of $15 buying comic books last month. Kim and Joe's combined expenditures totaled $9 more than Luke's. If Joe spent $4 more than Kim, then how much did each spend?

14. ______________________

 Name: ________________________

Solve each system by using the Gaussian elimination method.

1. $\begin{cases} 3x + 2y = 5 \\ 6x + 9y = 15 \end{cases}$

2. $\begin{cases} 2x - y - z = 4 \\ 3x + 2y - z = 7 \\ x - 3y + 5z = 13 \end{cases}$

1. ____________________

2. ____________________

Let $\mathbf{A} = \begin{bmatrix} 1 & 5 \\ -2 & 4 \end{bmatrix}$, $\mathbf{B} = \begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$, $\mathbf{C} = \begin{bmatrix} 4 \\ 3 \end{bmatrix}$, $\mathbf{D} = \begin{bmatrix} -2 \\ 1 \end{bmatrix}$, $\mathbf{E} = \begin{bmatrix} 3 \\ -1 \\ -2 \end{bmatrix}$,

$\mathbf{F} = \begin{bmatrix} 1 & 0 & -2 \end{bmatrix}$ **,and** $\mathbf{G} = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & 1 \\ 2 & -1 & 4 \end{bmatrix}$**. Find each of the following matrices or determinants, if possible.**

3. A – B

4. CA

5. | G |

6. G^{-1}

7. | A |

8. BD

9. C + 2D

10. FE

Solve each problem.

11. Solve the system using Cramer's Rule: $\begin{cases} 5x - y = 3 \\ -2x + 3y = 6 \end{cases}$.

11. ____________________

12. Find values of x and y that make the equation true: $\begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$.

12. ____________________

13. Solve the system by using an inverse matrix: $\begin{cases} 2x + 3y = -1 \\ x + 2y = 0 \end{cases}$.

13. ____________________

14. Solve by using a matrix method: Mark, Joey, and Tim dined at restaurants a total of 54 times last month. Joey and Tim's combined restaurant meals totaled one-half of Mark's. If Tim dined out 2 fewer times than Joey, then how many times did each dine at restaurants last month?

14. ____________________

Name:________________________

Multiple Choice: Choose the best answer for each problem.

_____ 1. **A 2×3 matrix has:**

a. 3 rows and 2 columns

b. an order of 6

c. 2 rows and 3 columns

d. an equivalent 3×2 matrix

_____ 2. **The matrix** $\begin{bmatrix} 2 & 5 & -1 \\ -3 & 4 & 2 \end{bmatrix}$ **is equivalent to which of the following?**

a. $\begin{bmatrix} 3 & -4 & -2 \\ 2 & 5 & -1 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 0 & -\frac{1}{2} \\ 0 & 1 & 1 \end{bmatrix}$

c. $\begin{bmatrix} 2 & 5 & -1 \\ -1 & 9 & 2 \end{bmatrix}$

d. $\begin{bmatrix} 1 & -9 & -3 \\ 0 & 1 & 1 \end{bmatrix}$

_____ 3. **Use matrices to find a, b, and c such that the graph of $y = ax^2 + bx + c$ goes through the points $(-1, 5), (2, -4), (1, 1)$.**

a. $a = 1,\ b = 2,\ c = 6$

b. $a = -1,\ b = -2,\ c = 4$

c. $a = 6,\ b = -17,\ c = 12$

d. No solution

_____ 4. **What is the additive identity for $n \times n$ matrices?**

a. an $n \times n$ zero matrix

b. the number zero

c. an $n \times 1$ zero matrix

d. There is none for square matrices.

_____ 5. **Perform the indicated operations:** $3\begin{bmatrix} x \\ y \end{bmatrix} - 2\begin{bmatrix} 5x \\ -y \end{bmatrix} + \begin{bmatrix} -5x \\ 2y \end{bmatrix}$.

a. $\begin{bmatrix} -12x \\ 5y \end{bmatrix}$

b. $\begin{bmatrix} -12x \\ 7y \end{bmatrix}$

c. $\begin{bmatrix} -18x \\ 10y \end{bmatrix}$

d. $\begin{bmatrix} x \\ 2y \end{bmatrix}$

_____ 6. **If $AX = B$ is a matrix equation for a system of n linear equations, and if A is invertible, then the solution to the system is:**

a. $X = A^{-1}B$

b. $X = BA^{-1}$

c. $X = A^{-1}$

d. $X = \frac{B}{A}$

_____ **7.** **In the first week of June, Ice Cream Dream Sundae Shoppe sold 30 vanilla, 25 chocolate, and 10 strawberry cones, while Yogurt Delite sold 50 vanilla, 60 chocolate, and 20 strawberry cones. If the Sundae Shoppe has a promotional "30%-off cones" sale during the second week of June, increasing their sales of each type of cone by 40%, while Yogurt Delite keeps the same sales as in week one, write a 2 $\times$ 3 matrix representing the number of cones sold in week two of June.**

a. $\begin{bmatrix} 30 & 20 & 10 \\ 50 & 60 & 20 \end{bmatrix}$ c. $\begin{bmatrix} 12 & 8 & 4 \\ 50 & 60 & 20 \end{bmatrix}$

b. $\begin{bmatrix} 39 & 26 & 13 \\ 50 & 60 & 20 \end{bmatrix}$ d. $\begin{bmatrix} 42 & 35 & 14 \\ 50 & 60 & 20 \end{bmatrix}$

_____ **8.** **If we are able to find the product AB of two matrices, then the product of the fourth row of A and the fifth column of B becomes what entry in the resultant matrix?**

a. The fifth entry on the fourth row c. the fourth entry on the fifth row

b. the fourth entry on the fourth row d. the fifth entry on the fifth row

_____ **9.** **Let $A = \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$, $C = \begin{bmatrix} 9 & 4 \\ 13 & 10 \end{bmatrix}$.**

Which of the following statements is false?

a. $AB = BA$ c. $2A + B = C$

b. $A(BC) = (AB)C$ d. $A + B = C - A$

_____ **10.** **Let $A = \begin{bmatrix} 2 & 3 & 1 \\ 3 & 3 & 1 \\ 2 & 4 & 1 \end{bmatrix}$. Find A^{-1}.**

a. $\begin{bmatrix} -1 & 1 & 0 \\ -1 & 0 & 1 \\ 6 & -5 & -3 \end{bmatrix}$ c. $\begin{bmatrix} -1 & 1 & 0 \\ -1 & 0 & -1 \\ 6 & -2 & -3 \end{bmatrix}$

b. $\begin{bmatrix} -1 & 1 & 0 \\ 1 & 0 & 0 \\ 6 & -2 & 0 \end{bmatrix}$ d. $\begin{bmatrix} -1 & 1 & 0 \\ -1 & 0 & 1 \\ 6 & -2 & -3 \end{bmatrix}$

_____ **11.** **Cramer's Rule will give the solution for all systems of two linear equations unless:**

a. the coefficient determinant is zero.

c. the system has a unique solution.

b. D_x is zero.

d. Both D_x and D_y are zero.

_____ **12.** **Solve using any matrix method: Fifty percent of the boys and sixty percent of the girls who attend Rothschild High School went to a recent pep-rally. The total number of students at the pep-rally was 320. If there are 590 students who attend Rothschild High, how many of these students are girls?**

a. 250 b. 270 c. 324 d. 430

_____ **13.** **Which of the following statements is false in general for a matrix A?**

I. $|A|$ is always non-negative.
II. The determinant of A can only be found if A is a square matrix.
III. To find the determinant of a 3 × 3 matrix, a sign array is used.

a. I only b. II only c. III only d. I and II

_____ **14.** **Consider the matrix** $\begin{bmatrix} 5 & 3 & 1 \\ 2 & 4 & -2 \\ -1 & 7 & 6 \end{bmatrix}$. **What is the minor for** -2 **?**

a. $\begin{bmatrix} 3 & 1 \\ 7 & 6 \end{bmatrix}$ b. $\begin{bmatrix} -3 & -1 \\ -7 & -6 \end{bmatrix}$ c. $\begin{bmatrix} 5 & 3 \\ -1 & 7 \end{bmatrix}$ d. $\begin{bmatrix} -5 & -3 \\ 1 & -7 \end{bmatrix}$

_____ **15.** **What is the determinant of the coefficient matrix for the system:**

$$\begin{cases} x + y = 2 \\ 3x - z = 5 \\ y + 2z = 1 \end{cases}.$$

a. -9 b. -5 c. 0 d. 7

_____ **16.** **If** $A = \begin{bmatrix} 3 & 2 \\ 1 & 7 \end{bmatrix}$ **and** $B = \begin{bmatrix} -1 & -2 \\ 0 & 5 \end{bmatrix}$, **find** $2\,|B + A|$ **.**

a. 46 b. $\begin{bmatrix} 4 & 0 \\ 2 & 24 \end{bmatrix}$ c. 48 d. $\begin{bmatrix} 4 & 0 \\ 2 & 12 \end{bmatrix}$

Chapter 9 Test -- Form F Name:________________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **A 2×3 matrix has:**

a. 2 rows and 3 columns
b. an order of 6
c. 3 rows and 2 columns
d. an equivalent 3×2 matrix

_____ **2.** **The matrix** $\begin{bmatrix} 2 & 5 & -1 \\ -3 & 4 & 2 \end{bmatrix}$ **is equivalent to which of the following?**

a. $\begin{bmatrix} 2 & 5 & -1 \\ -1 & 9 & 2 \end{bmatrix}$
b. $\begin{bmatrix} 1 & 0 & -\frac{1}{2} \\ 0 & 1 & 1 \end{bmatrix}$
c. $\begin{bmatrix} 3 & -4 & -2 \\ 2 & 5 & -1 \end{bmatrix}$
d. $\begin{bmatrix} 1 & -9 & -3 \\ 0 & 1 & 1 \end{bmatrix}$

_____ **3.** **Use matrices to find a, b, and c such that the graph of $y = ax^2 + bx + c$ goes through the points $(-1, 7), (2, 4), (1, 3)$.**

a. $a = 1,\ b = -2,\ c = 4$
b. $a = 1,\ b = 2,\ c = 6$
c. $a = 6,\ b = -17,\ c = 12$
d. No solution

_____ **4.** **What is the additive identity for $n \times n$ matrices?**

a. an $n \times 1$ zero matrix
b. the number zero
c. an $n \times n$ zero matrix
d. There is none for square matrices.

_____ **5.** **Perform the indicated operations:** $3\begin{bmatrix} x \\ y \end{bmatrix} - \begin{bmatrix} 5x \\ -y \end{bmatrix} + 2\begin{bmatrix} 5x \\ 2y \end{bmatrix}$.

a. $\begin{bmatrix} 8x \\ 4y \end{bmatrix}$
b. $\begin{bmatrix} x \\ y \end{bmatrix}$
c. $\begin{bmatrix} 8x \\ 8y \end{bmatrix}$
d. $\begin{bmatrix} x \\ 2y \end{bmatrix}$

_____ **6.** **If $AX = B$ is a matrix equation for a system of n linear equations, and if A is invertible, then the solution to the system is:**

a. $X = A^{-1}$
b. $X = BA^{-1}$
c. $X = A^{-1}B$
d. $X = \frac{B}{A}$

_____ **7.** **In the first week of June, Ice Cream Dream Sundae Shoppe sold 30 vanilla, 25 chocolate, and 10 strawberry cones, while Yogurt Delite sold 50 vanilla, 60 chocolate, and 20 strawberry cones. If the Sundae Shoppe has a promotional "30%-off cones" sale during the second week of June, increasing their sales of each type of cone by 40%, while Yogurt Delite keeps the same sales as in week one, write a 2 × 3 matrix representing the number of cones sold in week two of June.**

a. $\begin{bmatrix} 42 & 35 & 14 \\ 50 & 60 & 20 \end{bmatrix}$

c. $\begin{bmatrix} 12 & 8 & 4 \\ 50 & 60 & 20 \end{bmatrix}$

b. $\begin{bmatrix} 39 & 26 & 13 \\ 50 & 60 & 20 \end{bmatrix}$

d. $\begin{bmatrix} 42 & 28 & 14 \\ 50 & 60 & 20 \end{bmatrix}$

_____ **8.** **If we are able to find the product AB of two matrices, then the product of the fifth row of A and the fourth column of B becomes what entry in the resultant matrix?**

a. The fifth entry on the fourth row

c. the fourth entry on the fifth row

b. the fourth entry on the fourth row

d. the fifth entry on the fifth row

_____ **9.** **Let** $A = \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$, $C = \begin{bmatrix} 9 & 4 \\ 13 & 10 \end{bmatrix}$.

Which of the following statements is false?

a. $AB = BA$

c. $2A + B = C$

b. $A(BC) = (AB)C$

d. $A + B = C - A$

_____ **10.** **Let** $A = \begin{bmatrix} 2 & 3 & 1 \\ 3 & 3 & 1 \\ 2 & 4 & 1 \end{bmatrix}$. **Find** A^{-1}.

a. $\begin{bmatrix} -1 & 1 & 0 \\ -1 & 0 & 1 \\ 6 & -5 & -3 \end{bmatrix}$

c. $\begin{bmatrix} -1 & 1 & 0 \\ -1 & 0 & 1 \\ 6 & -2 & -3 \end{bmatrix}$

b. $\begin{bmatrix} -1 & 1 & 0 \\ 1 & 0 & 0 \\ 6 & -2 & 0 \end{bmatrix}$

d. $\begin{bmatrix} -1 & 1 & 0 \\ -1 & 0 & -1 \\ 6 & -2 & -3 \end{bmatrix}$

_____ **11.** **Cramer's Rule will give the solution for all systems of two linear equations unless:**

a. the system has a unique solution.
b. D_x is zero.
c. the coefficient determinant is zero.
d. Both D_x and D_y are zero.

_____ **12.** **Solve using any matrix method: Fifty percent of the boys and sixty percent of the girls who attend Rothschild High School went to a recent pep-rally. The total number of students at the pep-rally was 320. If there are 590 students who attend Rothschild High, how many of these students are boys?**

a. 250　　b. 340　　c. 324　　d. 430

_____ **13.** **Which of the following statements is false in general for a matrix A?**
I. $|A|$ is always non-negative.
II. The determinant of A can only be found if A is a square matrix.
III. To find the determinant of a 3×3 matrix, a sign array is used.

a. I only　　b. II only　　c. III only　　d. I and II

_____ **14.** **Consider the matrix** $\begin{bmatrix} 5 & 3 & 1 \\ 2 & 4 & -2 \\ -1 & 7 & 6 \end{bmatrix}$**. What is the minor for -2?**

a. $\begin{bmatrix} 3 & 1 \\ 7 & 6 \end{bmatrix}$　　b. $\begin{bmatrix} -3 & -1 \\ -7 & -6 \end{bmatrix}$　　c. $\begin{bmatrix} -5 & -3 \\ 1 & -7 \end{bmatrix}$　　d. $\begin{bmatrix} 5 & 3 \\ -1 & 7 \end{bmatrix}$

_____ **15.** **What is the determinant of the coefficient matrix for the system:**

$$\begin{cases} x + y = 2 \\ 3x - z = 5 \\ y + 2z = 1 \end{cases}.$$

a. -9　　b. 5　　c. -5　　d. 7

_____ **16.** **If $A = \begin{bmatrix} 3 & 2 \\ 1 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -2 \\ 0 & 5 \end{bmatrix}$, find $2\,|B + A|$.**

a. 48　　b. $\begin{bmatrix} 4 & 0 \\ 2 & 24 \end{bmatrix}$　　c. 46　　d. $\begin{bmatrix} 4 & 0 \\ 2 & 12 \end{bmatrix}$

Name: ______________________

Sketch the graph of each equation.

1. $y^2 - 4y + 1 - x = 0$

2. $(x+1)^2 + 4y^2 = 4$

3. $\frac{x^2}{16} - \frac{y^2}{4} = 1$

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

Determine the equation of each conic section.

5. A circle with center $(2, -1)$ and radius 4.

5. ______________________

6. A parabola with focus $(2, 1)$ and directrix $y = -1$.

6. ______________________

7. An ellipse with foci $(\pm 1, 0)$ and x-intercepts $(\pm 3, 0)$.

7. ______________________

8. A hyperbola with foci $(0, \pm 4)$ and vertices $(0, \pm 2)$.

8. ____________________

Solve each problem.

9. Find the center and radius of the circle $x^2 + y^2 - 3y + 6x - 4 = 0$.

9. ____________________

10. Find the vertex, focus, and the equation of the directrix for the parabola $y = 2x^2 - x - 3$.

10. *vertex:* ____________________
focus: ____________________
directrix: ____________________

11. Find the equations of the asymptotes for the hyperbola $\frac{y^2}{9} - \frac{(x-1)^2}{4} = 1$.

11. ____________________

12. Find the foci, length of the major axis, and length of the minor axis for the ellipse $\frac{x^2}{9} + \frac{y^2}{49} = 1$.

12. *foci:* ____________________
length of major axis: ________
length of minor axis: ________

Name: ____________________

Sketch the graph of each equation.

1. $y^2 = -(x+1)^2 + 4$

2. $(x-1)^2 + 4(y+2)^2 = 16$

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

4. $(x+1)^2 + (y+3)^2 = 4$

Determine the equation of each conic section.

5. A circle with center $(1, -2)$ and radius 2.

5. ____________________

6. A parabola with focus $(2, 1)$ and directrix $x = -2$.

6. ____________________

7. An ellipse with foci $(\pm 1, 0)$ and y-intercepts $(0, \pm 3)$.

7. ____________________

8. A hyperbola with foci $(\pm 5, 0)$ and vertices $(\pm 2, 0)$.

8. ____________________

Solve each problem.

9. Find the center and radius of the circle $x^2 + y^2 + 5y - 8x + 3 = 0$.

9. ____________________

10. Find the vertex, focus, and the equation of the directrix for the parabola $y = -\frac{1}{4}x^2 + \frac{1}{2}x + \frac{7}{4}$.

10. *vertex:* ____________________
focus: ____________________
directrix: ____________________

11. Find the equations of the asymptotes for the hyperbola $\frac{(y+1)^2}{16} - \frac{x^2}{25} = 1$.

11. ____________________

12. Find the foci, length of the major axis, and length of the minor axis for the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$.

12. *foci:* ____________________
length of major axis: ________
length of minor axis: ________

Name: ________________________

Sketch the graph of each equation.

1. $\frac{x^2}{9} - y^2 = 1$

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

3. $(x-1)^2 + y^2 = 16$

4. $(x+2)^2 + 4y^2 = 16$

Determine the equation of each conic section.

5. A circle with center $(2, 3)$ which passes through the point $(5, -1)$.

5. ________________________

6. A parabola with focus $(3, 2)$ and vertex $(3, 0)$.

6. ________________________

7. An ellipse with foci $(0, \pm 4)$ and y-intercepts $(0, \pm 7)$.

7. ________________________

8. A hyperbola whose transverse axis has endpoints $(\pm 7, 0)$ and whose conjugate axis has endpoints $(0, \pm 1)$.

8. ____________________

Solve each problem.

9. Find the center and radius of the circle $x^2 - 5y + y^2 + 4x - 1 = 0$.

9. ____________________

10. Find the vertex, focus, and the equation of the directrix for the parabola $y = \frac{1}{8}x^2 - \frac{1}{2}x + \frac{3}{2}$.

10. *vertex:* ____________________
focus: ____________________
directrix: ____________________

11. Find the equations of the asymptotes for the hyperbola $\frac{x^2}{64} - \frac{y^2}{81} = 1$.

11. ____________________

12. Find the foci of the ellipse $\frac{(x+1)^2}{4} + \frac{(y-2)^2}{9} = 1$.

12. ____________________

 Name: ______________________

Sketch the graph of each equation.

1. $\frac{y^2}{9} - \frac{x^2}{4} = 1$

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

3. $x^2 + (y+2)^2 = 4$

4. $4x^2 + (y-1)^2 = 16$

Determine the equation of each conic section.

5. A circle with a diameter which has endpoints of $(1, 5)$ and $(3, 4)$.

5. ______________________

6. A parabola with vertex $(2, 3)$ and directrix $x = 0$.

6. ______________________

7. An ellipse with foci $(0, \pm 6)$ and x-intercepts $(\pm 2, 0)$.

7. ______________________

8. A hyperbola with vertices of the fundamental rectangle at $(3, \pm 5)$ and $(-3, \pm 5)$ and with branches opening upwards and downwards.

8. ____________________

Solve each problem.

9. Find the center and radius of the circle $x^2 + y^2 - 8y = 0$.

9. ____________________

10. Find the vertex, focus, and the equation of the directrix for the parabola $y^2 + 4 = 4x$.

10. *vertex:* ____________________
focus: ____________________
directrix: ____________________

11. Find the equations of the asymptotes for the hyperbola $\frac{x^2}{49} - \frac{y^2}{25} = 1$.

11. ____________________

12. Find the foci of the ellipse $\frac{(x-3)^2}{4} + \frac{(y+2)^2}{9} = 1$

12. ____________________

 Name: ________________________

Multiple Choice: Choose the best answer for each problem.

_____ 1. **Give the equation of the directrix for the parabola $x = \frac{1}{8}(y-2)^2 - 3$.**

a. $x = -1$ b. $x = -3$ c. $x = -5$ d. $x = -\frac{5}{2}$

_____ 2. **Give the equation of the parabola with vertex (2, 1) and directrix $x = 5$.**

a. $x = -\frac{1}{12}(y-1)^2 + 2$
b. $y = 5(x-2)^2 + 1$
c. $x = 5(y-1)^2 + 2$
d. $x = -12(y-1)^2 + 2$

_____ 3. **Which way does the graph of the parabola $y^2 - 8y + 6x - 2 = 0$ open ?**

a. To the right b. To the left c. Up d. Down

_____ 4. **Give an equation of the parabola with vertex $(-5, 1)$ and focus $\left(-5, \frac{5}{4}\right)$.**

a. $y = \frac{1}{4}(x+5)^2 + 1$
b. $y = (x+5)^2 + 1$
c. $x = (y-1)^2 - 5$
d. $y = \frac{1}{4}(x-5)^2 + 1$

_____ 5. **Write $y = \frac{1}{3}x^2 - 2x + 1$ in the form $y = a(x-h)^2 + k$.**

a. $y = \frac{1}{3}(x-3)^2 - 2$
b. $y = \frac{1}{3}(x-2)^2 + 1$
c. $y = (x-3)^2 - 6$
d. $y = \frac{1}{3}(x-1)^2$

_____ 6. **Find the center of the circle whose equation is $x^2 + y^2 + 3x - 8y - 8 = 0$.**

a. $\left(\frac{3}{2}, -4\right)$ b. $(-3, 8)$ c. $\left(-\frac{3}{2}, 4\right)$ d. $(3, -8)$

_____ 7. **Give the equation of the ellipse with intercepts $(\pm 4, 0)$ and $(0, \pm 2)$.**

a. $\frac{x^2}{8} + \frac{y^2}{4} = 1$ b. $\frac{x^2}{4} + \frac{y^2}{2} = 1$ c. $\frac{x^2}{16} + \frac{y^2}{4} = 1$ d. $\frac{x^2}{16} - \frac{y^2}{4} = 1$

_____ 8. **Write the equation of the circle with center $(2, -1)$ and which passes through the point $(3, 4)$.**

a. $(x-2)^2 + (y+1)^2 = 26$
b. $(x+2)^2 + (y-1)^2 = 26$
c. $(x-2)^2 + (y+1)^2 = 6$
d. $(x+2)^2 + (y-1)^2 = 6$

_____ 9. **Find the y-intercepts for the ellipse $\frac{x^2}{3} + \frac{y^2}{4} = 1$.**

a. $(0, 4), (0, -4)$
b. $(\sqrt{3}, 0), (-\sqrt{3}, 0)$
c. $(3, 0), (-3, 0)$
d. $(0, 2), (0, -2)$

_____ **10.** **Find the length of the major axis of the ellipse $\frac{x^2}{5} + \frac{y^2}{6} = 1$.**

a. $\sqrt{6}$ b. $\sqrt{5}$ c. $2\sqrt{6}$ d. $2\sqrt{5}$

_____ **11.** **A compass is opened to a width of 2 units. The sharp end of the compass is placed on a coordinate system 3 units to the left and 1 unit up from a point of origin. Give the equation of the path traced by the pencil end of the compass.**

a. $(x+3)^2 + (y-1)^2 = 4$
b. $(x-3)^2 + (y-1)^2 = 4$
c. $y - 3x = 2$
d. $(x+3)^2 + (y-1)^2 = 2$

_____ **12.** **Give the equation of the hyperbola with intercepts $(4,0)$, $(-4,0)$, and foci $(6,0)$ and $(-6,0)$.**

a. $\frac{x^2}{16} - \frac{y^2}{36} = 1$ b. $\frac{x^2}{16} - \frac{y^2}{20} = 1$ c. $\frac{x^2}{16} - \frac{y^2}{52} = 1$ d. $\frac{y^2}{16} - \frac{x^2}{36} = 1$

_____ **13.** **Give the equations of the asymptotes of the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$.**

a. $y = \frac{3}{4}x$, $y = -\frac{3}{4}x$
b. $y = \frac{9}{16}x$, $y = -\frac{9}{16}x$
c. $y = \frac{4}{3}x$, $y = -\frac{4}{3}x$
d. $y = \frac{16}{9}x$, $y = -\frac{16}{9}x$

_____ **14.** **Identify the graph of the equation $(y-2)^2 = -4x$.**

a. ellipse b. straight line c. parabola d. hyperbola

_____ **15.** **Describe the graph of $\frac{(x-3)^2}{64} - \frac{(y+1)^2}{24} = 1$.**

a. A hyperbola with branches opening up and down.
b. A hyperbola with branches opening right and left.
c. A circle with center $(3, -1)$.
d. An ellipse with center $(3, -1)$.

_____ **16.** **Define a hyperbola.**

a. The set of points in a plane such that the difference between the distances from two fixed points is a constant.
b. The set of points in a plane such that the sum of the distances from two fixed points is a constant.
c. The set of points in a plane equidistant from a fixed point.
d. The set of points in a plane equidistant from a fixed line and a fixed point not on the line.

 Name: ________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **Give the equation of the directrix for the parabola $x = \frac{1}{8}(y-2)^2 + 3$.**

a. $x = 1$ b. $x = -3$ c. $x = -5$ d. $x = -1$

_____ **2.** **Give the equation of the parabola with vertex $(2, 1)$ and directrix $x = 5$.**

a. $x = -12(y-1)^2 + 2$
b. $y = 5(x-2)^2 + 1$
c. $x = 5(y-1)^2 + 2$
d. $x = -\frac{1}{12}(y-1)^2 + 2$

_____ **3.** **Which way does the graph of the parabola $y^2 - 8y - 6x - 2 = 0$ open ?**

a. To the right b. To the left c. Up d. Down

_____ **4.** **Give an equation of the parabola with vertex $(-5, 1)$ and focus $\left(-5, \frac{5}{4}\right)$.**

a. $y = (x+5)^2 + 1$
b. $y = \frac{1}{4}(x+5)^2 + 1$
c. $x = (y-1)^2 - 5$
d. $y = \frac{1}{4}(x-5)^2 + 1$

_____ **5.** **Write $y = \frac{1}{2}x^2 - 4x + 1$ in the form $y = a(x-h)^2 + k$.**

a. $y = \frac{1}{2}(x-4)^2 + 1$
b. $y = \frac{1}{2}(x-4)^2 - 7$
c. $y = (x-4)^2 + 9$
d. $y = \frac{1}{2}(x-8)^2 + 1$

_____ **6.** **Find the center of the circle whose equation is $x^2 + y^2 - 3x + 8y - 8 = 0$.**

a. $\left(\frac{3}{2}, -4\right)$ b. $(-3, 8)$ c. $\left(-\frac{3}{2}, 4\right)$ d. $(3, -8)$

_____ **7.** **Give the equation of the ellipse with intercepts $(\pm 2, 0)$ and $(0, \pm 4)$.**

a. $\frac{x^2}{8} + \frac{y^2}{4} = 1$ b. $\frac{x^2}{4} + \frac{y^2}{16} = 1$ c. $\frac{x^2}{16} - \frac{y^2}{4} = 1$ d. $\frac{x^2}{16} + \frac{y^2}{4} = 1$

_____ **8.** **Write the equation of the circle with center $(-2, 1)$ and which passes through the point $(3, 4)$.**

a. $(x-2)^2 + (y+1)^2 = 14$
b. $(x+2)^2 + (y-1)^2 = 34$
c. $(x-2)^2 + (y+1)^2 = 2$
d. $(x+2)^2 + (y-1)^2 = 14$

_____ **9.** **Find the y-intercepts for the ellipse $\frac{x^2}{3} + \frac{y^2}{4} = 1$.**

a. $(0, 4), (0, -4)$
b. $(\sqrt{3}, 0), (-\sqrt{3}, 0)$
c. $(3, 0), (-3, 0)$
d. $(0, 2), (0, -2)$

_____ **10.** **Find the length of the minor axis of the ellipse $\frac{x^2}{5} + \frac{y^2}{6} = 1$.**

a. $\sqrt{6}$ b. $\sqrt{5}$ c. $2\sqrt{6}$ d. $2\sqrt{5}$

_____ **11.** **A compass is opened to a width of 2 units. The sharp end of the compass is placed on a coordinate system 3 units to the left and 1 unit up from a point of origin. Give the equation of the path traced by the pencil end of the compass.**

a. $(x+3)^2 + (y-1)^2 = 4$
b. $(x-3)^2 + (y-1)^2 = 4$
c. $y - 3x = 2$
d. $(x+3)^2 + (y-1)^2 = 2$

_____ **12.** **Give the equation of the hyperbola with intercepts $(4, 0)$, $(-4, 0)$ and foci $(6, 0)$ and $(-6, 0)$.**

a. $\frac{x^2}{16} - \frac{y^2}{20} = 1$ b. $\frac{x^2}{16} - \frac{y^2}{36} = 1$ c. $\frac{x^2}{16} - \frac{y^2}{52} = 1$ d. $\frac{y^2}{16} - \frac{x^2}{36} = 1$

_____ **13.** **Give the equations of the asymptotes of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$.**

a. $y = \frac{3}{4}x$, $y = -\frac{3}{4}x$
b. $y = \frac{9}{16}x$, $y = -\frac{9}{16}x$
c. $y = \frac{4}{3}x$, $y = -\frac{4}{3}x$
d. $y = \frac{16}{9}x$, $y = -\frac{16}{9}x$

_____ **14.** **Identify the graph of the equation $(y-2)^2 = -4x^2 + 1$.**

a. ellipse b. circle c. parabola d. hyperbola

_____ **15.** **Describe the graph of $\frac{(x-3)^2}{64} - \frac{(y+1)^2}{24} = 1$.**

a. A hyperbola with branches opening up and down.
b. A hyperbola with branches opening right and left.
c. A circle with center $(3, -1)$.
d. An ellipse with center $(3, -1)$.

_____ **16.** **Define a hyperbola.**

a. The set of points in a plane such that the difference between the distances from two fixed points is a constant.
b. The set of points in a plane such that the sum of the distances from two fixed points is a constant.
c. The set of points in a plane equidistant from a fixed point.
d. The set of points in a plane equidistant from a fixed line and a fixed point not on the line.

Chapter 11 Test -- Form A Name: ________________________

List the terms of each finite sequence.

1. $a_n = \frac{2}{3}(n-1) + \frac{1}{3}$ for $1 \le n \le 3$

2. $b_1 = 5, b_2 = 2, b_n = b_{(n-1)} - b_{(n-2)}$ for $3 \le n \le 6$

1. ________________________

2. ________________________

Write a formula for the n^{th} term of each infinite sequence. Do not use a recursion formula.

3. 1, 8, 27, 64, $\cdots$

4. 3, 6, 12, 24, $\cdots$

5. -3, 2, 7, 12, $\cdots$

3. ______________

4. ______________

5. ____________

Find the sum of each series. Round answers to the nearest hundredth, if necessary.

6. $\sum_{j=0}^{49}(2j-3)$

7. $\sum_{n=1}^{25} 2 \cdot (1.02)^n$

6. ________________________

7. ________________________

Solve each problem.

8. How many terms are there in the arithmetic sequence 2, 5, 8, $\cdots$, 293 ?

8. ________________________

9. How many different eleven-letter "words" can be made from the letters in "MISSISSIPPI"?

9. ________________________

10. Find the 100^{th} term in the sequence: $4, 0, -4, -8, \cdots$.

10. ________________________

11. Write all of the terms of the binomial expansion for $(x - 3y)^4$.

11. ______________________________

12. Write the binomial expansion for $(m + n)^{25}$ using summation notation.

12. ______________________________

13. If a pair of fair dice is rolled, what are the odds in favor of the sum of the numbers being 4?

13. ______________________________

14. A collector of antique guns has 62 guns, but she can only display 5 at a time. How many different sets of 5 could be chosen for display?

14. ______________________________

15. In a lottery, a person placing a bet randomly selects 3 digits from the digits 0 through 9, without repetition allowed, and places them in order on a ticket. The winning 3-digit number is to be selected that evening. What is the probability that the person will choose the winning number?

15. ______________________________

16. Use mathematical induction to prove that $1 + 3 + 5 + \cdots + (2n - 1) = n^2$ for every positive integer n.

Name: ________________________

List the terms of each finite sequence.

1. $a_n = \frac{1}{3}(n-1) + \frac{4}{3}$ for $1 \le n \le 3$

2. $b_1 = 5, b_2 = 2, b_n = b_{(n-1)} + b_{(n-2)}$ for $3 \le n \le 6$

1. ________________________ 2. ________________________

Write a formula for the n^{th} term of each infinite sequence. Do not use a recursive formula.

3. $1, 4, 9, 16, \cdots$

4. $4, 12, 36, 108, \cdots$

5. $-2, 2, 6, 10, \cdots$

3. ______________ 4. ______________ 5. ___________

Find the sum of each series. Round answers to the nearest hundredth.

6. $\sum_{n=0}^{8} 2 \cdot \left(\frac{2}{3}\right)^n$

7. $\sum_{j=1}^{38} (3j+1)$

6. ________________________ 7. ________________________

Solve each problem.

8. How many terms are there in the arithmetic sequence $2, 5, 8, \cdots, 299$?

8. ________________________

9. How many different nine-letter “words" can be made from the letters in "LOUISIANA"?

9. ________________________

10. Find the 98^{th} term in the sequence: $4, 0, -4, -8, \cdots$.

10. ________________________

11. Write all of the terms of the binomial expansion for $(2x + y)^4$.

11. ______________________________

12. Write the binomial expansion for $(a + b)^{20}$ using summation notation.

12. ______________________________

13. If a pair of fair dice is rolled, what are the odds in favor of the sum of the numbers being 5?

13. ______________________________

14. A collector of antique guns has 60 guns, but she can only display 4 at a time. How many different sets of 4 could be chosen for display?

14. ______________________________

15. In a lottery, a person placing a bet randomly selects 4 digits from the digits 0 through 9, without repetition allowed, and places them in order on a ticket. The winning 4-digit number is to be selected that evening. What is the probability that the person will choose the winning number?

15. ______________________________

16. Use mathematical induction to prove that $2 + 4 + 6 + \cdots + 2n = n(n + 1)$ for every positive integer n.

Name: ________________________

List the terms of each finite sequence.

1. $a_n = -2(n-1)+5$
for $1 \leq n \leq 3$

2. $b_1 = 5, b_2 = 2, b_n = b_{(n-1)} \cdot b_{(n-2)}$
for $3 \leq n \leq 6$

1. ________________________

2. ________________________

Write a formula for the n^{th} term of each infinite sequence. Do not use a recursive formula.

3. $1, 16, 81, 256, \cdots$

4. $3, 7, 11, 15, \cdots$

5. $2, 8, 32, 128, \cdots$

3. ______________

4. ______________

5. ______________

Find the sum of each series. Round answers to the nearest hundredth.

6. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots$

7. $\sum_{n=1}^{50} (3-4n)$

6. ________________________

7. ________________________

Solve each problem.

8. How many terms are there in the arithmetic sequence $1, 5, 9, \cdots, 353$?

8. ________________________

9. A dinner with one choice each of salad, main course and dessert at Cracker Town costs \$6.99. How many different dinners are possible if there are 4 types of salad, 5 main courses, and 3 desserts from which to choose?

9. ________________________

10. Find the 100^{th} term in the sequence: $3, 1, -1, -3, \cdots$.

10. ________________________

11. Write all of the terms of the binomial expansion for $(a + 2b)^5$.

11. ______________________________

12. Write the binomial expansion for $(2m + n)^{18}$ using summation notation.

12. ______________________________

13. Five cards are dealt from a standard deck of 52 cards (4 aces in a deck). What is the probability that the first two cards dealt are aces and the next three are not?

13. ______________________________

14. A collector of crystal animals has 57 pieces, but she can only display 5 at a time. How many different sets of 5 could be chosen for display?

14. ______________________________

15. A bag contains 20 candies: 3 cherry, 4 orange, 7 lemon and 6 grape. If two candies are selected blindly, what is the probability that they are both the same flavor?

15. ______________________________

16. Use mathematical induction to prove that $1 + 5 + 9 + \cdots + (4n - 3) = n(2n - 1)$ for every positive integer n.

Chapter 11 Test -- Form D **Name:** ________________________

List the terms of each finite sequence.

1. $a_n = 2 \cdot 3^{(n-1)}$ for $1 \leq n \leq 3$

2. $b_1 = 2, b_2 = 3, b_n = b_{(n-1)} \cdot b_{(n-2)}$ for $3 \leq n \leq 6$

1. ________________________ 2. ________________________

Write a formula for the n^{th} term of each infinite sequence. Do not use a recursive formula.

3. $2^2, 2^5, 2^8, 2^{11}, \cdots$

4. $-3, 6, -12, 24, \cdots$

5. $5, 8, 11, 14, \cdots$

3. ______________ 4. ______________ 5. ______________

Find the sum of each series. Round answers to the nearest hundredth.

6. $\sum_{j=0}^{28}(3j-4)$

7. $\sum_{n=1}^{\infty}\left(\frac{2}{3}\right)^{n-1}$

6. ________________________ 7. ________________________

Solve each problem.

8. How many terms are there in the arithmetic sequence 1, 5, 9, $\cdots$, 377?

8. ________________________

9. A dinner with one choice each of salad, main course and dessert at Cracker Town costs \$6.99. How many different dinners are possible if there are 3 types of salad, 6 main courses, and 4 desserts from which to choose?

9. ________________________

10. Find the 98^{th} term in the sequence: $3, 1, -1, -3, \cdots$.

10. ________________________

11. Write all of the terms of the binomial expansion for $(2a - b)^5$.

11. ______________________________

12. Write the binomial expansion for $(a + 2b)^{24}$ using summation notation.

12. ______________________________

13. Five cards are dealt from a standard deck of 52 cards (4 aces in a deck). What is the probability that the first three cards dealt are aces and the next two are not?

13. ______________________________

14. A collector of crystal animals has 50 pieces, but she can only display 6 at a time. How many different sets of 6 could be chosen for display?

14. ______________________________

15. A bag contains 20 candies: 3 cherry, 4 orange, 7 lemon and 6 grape. If two candies are selected blindly, what is the probability that they are both the same flavor?

15. ______________________________

16. Use mathematical induction to prove that $3 + 9 + 15 + \cdots + (6n - 3) = 3n^2$ for every positive integer n.

Name: ________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **Find the first four terms for the sequence whose n^{th} term is $a_n = n(n-1)!$**

a. 1, 2, 6, 12 b. 1, 2, 720, 12! c. 0, 2, 6, 24 d. 1, 2, 6, 24

_____ **2.** **Find all terms for a sequence whose n^{th} term is $b_n = (-1)^n\, n^2$, for $1 \le n \le 3$.**

a. $-1, 4, -9$ b. 1, 4, 9 c. $-1, -4, -9$ d. $1, -4, 9$

_____ **3.** **Write a recursion formula for the sequence 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\cdots$.**

a. $a_{n-1} = \frac{1}{2}a_n$ b. $a_n = \frac{1}{2}a_{n-1}$ c. $a_n = (a_{n-1}) - \frac{1}{2}$ d. $a_n = 2a_{n-1}$

_____ **4.** **Write the series $1 + b^2 + b^4 + b^6 + \cdots + b^{12}$ using summation notation.**

a. $\sum_{i=1}^{7} b^{2\,(i-1)}$ b. $\sum_{i=1}^{6} b^{2i}$ c. $\sum_{i=0}^{12} b^{i}$ d. $\sum_{i=0}^{12} b^{2i}$

_____ **5.** **Find the sum of the series: $-6 + 1 + 8 + 15 + \cdots + 50$.**

a. 68 b. 176 c. 198 d. 396

_____ **6.** **Write a formula for the n^{th} term of the geometric sequence: 6, 4, $\frac{8}{3}$, $\frac{16}{9}$,$\cdots$.**

a. $a_n = 6\left(\frac{2}{3}\right)^{n-1}$ b. $a_n = 4^{n-1}$ c. $a_n = 6\left(\frac{2}{3}\right)^{n}$ d. $r = \frac{2}{3}$

_____ **7.** **Find the number of terms of a geometric sequence with first term $\frac{1}{3}$, common ratio 0.5, and last term $\frac{1}{768}$.**

a. 8 b. 9 c. 10 d. 256

_____ **8.** **How many four-digit odd integers greater than 2000 can be formed using the digits 0, 1, 2, and 3 at most once?**

a. 1 b. 4 c. 6 d. 12

_____ **9.** **A pizza can be ordered in a medium or a large size. The toppings available are pepperoni, ground meat, Canadian bacon, mushrooms, and green peppers. How many different two-topping pizzas could be ordered? (Cheese is included on all pizzas and not counted as one of the toppings.)**

a. 10 b. 20 c. 40 d. 120

_____ **10.** **The Rolling Stones had 17 number one hit records, and the Beatles had 23. If a disc jockey wants to play first a Stones hit and then a Beatles hit, how many different pairs of songs (in that order) could be selected?**

a. 391 b. 782 c. 1560 d. 1600

_____ **11.** **Ten students are available to help with a biology project. Five students are needed to collect samples, 3 are needed to take measurements, and 2 are needed to record the data. In how many ways can these jobs be assigned to these 10 students?**

a. 30 b. 300 c. 2520 d. 5040

_____ **12.** **Find the middle term in the expansion of $(\frac{x}{2} + 2y^2)^6$.**

a. $20x^3y^6$ b. $5x^3y^6$ c. $20x^3y^5$ d. $\frac{15}{4}\,x^4y^4$

_____ **13.** **If the odds in favor of event A are $2:1$, what is the probability that event A will *not* occur?**

a. $\frac{1}{3}$ b. $\frac{1}{2}$ c. $\frac{2}{3}$ d. 2

_____ **14.** **A survey of 100 people found that 30 people subscribe to *U.S. News*, 50 subscribe to *Newsweek*, and 15 subscribe to both. How many subscribe to either *U.S. News* or *Newsweek* ?**

a. 95 b. 85 c. 80 d. 65

_____ **15.** **Find $\sum_{n=1}^{\infty} \left(\frac{2}{5}\right)^{n-1}$.**

a. 1 b. $\frac{5}{2}$ c. $\frac{5}{3}$ d. $\frac{3}{2}$

_____ **16.** **Find the 100th term in the sequence: $2, 9, 16, 23, \cdots$.**

a. 702 b. 695 c. 202 d. 15

_____ **17.** **A bag contains 20 candies: 3 cherry, 4 orange, 7 lemon, and 6 grape. If two candies are selected blindly, what is the probability that they are both the same flavor?**

a. $\frac{1}{2}$ b. 90 c. $\frac{9}{40}$ d. $\frac{9}{38}$

_____ **18.** **If a pair of fair dice is rolled, what are the odds in favor of the sum being a 4?**

a. 1 to 12 b. 4 to 11 c. 1 to 11 d. 1 to 18

 Name: ________________________

Multiple Choice: Choose the best answer for each problem.

_____ **1.** **Find the first four terms for the sequence whose n^{th} term is $a_n = (n-1)n!$**

a. 1, 2, 12, 72 b. 1, 2, 720, 12! c. 0, 2, 12, 72 d.1, 2, 6, 24

_____ **2.** **Find all terms for a sequence whose n^{th} term is $b_n = (-1)^{n+1} \cdot n^2$, $1 \le n \le 3$.**

a. $-1, 4, -9$ b. $1, 4, 9$ c. $-1, -4, -9$ d. $1, -4, 9$

_____ **3.** **Write a recursion formula for the sequence $\frac{1}{16}, \frac{1}{8}, \frac{1}{4}, \frac{1}{2}, 1 \cdots$.**

a. $a_{n-1} = \frac{1}{2}a_n$ b. $a_n = \frac{1}{2}a_{n-1}$ c. $a_n = (a_{n-1}) - \frac{1}{2}$ d. $a_n = 2a_{n-1}$

_____ **4.** **Find the sum $\sum_{n=2}^{6} (-1)^n\, 2^n$.**

a. 124 b. -44 c. 44 d. -124

_____ **5.** **Find the sum of the series: $(-13) + (-6) + 1 + 8 + \cdots + 50$.**

a. 383 b. 185 c. 163 d. 40

_____ **6.** **Write a formula for the n^{th} term of the geometric sequence: 6, 4, $\frac{8}{3}$, $\frac{16}{9}$,$\cdots$.**

a. $a_n = 6\left(\frac{2}{3}\right)^n$ b. $a_n = 4^{n-1}$ c. $a_n = 6\left(\frac{2}{3}\right)^{n-1}$ d. $r = \frac{2}{3}$

_____ **7.** **If \$2000 is deposited at the beginning of a month into an account earning 6% annual interest compounded monthly, then how much will be in the account at the end of the 50^{th} month?**

a. \$2120.00 b. \$2150.00 c. \$2566.45 d. \$36,840.31

_____ **8.** **Find the number of terms of a geometric sequence with first term $\frac{1}{3}$, common ratio 0.5, and last term $\frac{1}{384}$.**

a. 8 b. 9 c. 10 d. 256

_____ **9.** **How many four-digit even integers greater than 3000 can be formed using the digits 0, 1, 2, and 3 at most once?**

a. 1 b. 4 c. 6 d. 12

_____ **10.** **If the odds in favor of event A are $2:1$, what is the probability that event A will occur?**

a. $\frac{1}{3}$ b. $\frac{1}{2}$ c. $\frac{2}{3}$ d. 2

_____ **11.** **A pizza can be ordered in small, medium or large size. The toppings available are pepperoni, ground meat, Canadian bacon, mushrooms, and green peppers. How many different two-topping pizzas could be ordered? (Cheese is included on all pizzas and not counted as one of the toppings.)**

a. 15 b. 30 c. 60 d. 120

_____ **12.** **Ten students are available to help with a biology project. Five students are needed to collect samples, 3 are needed to take measurements, and 2 are needed to record the data. In how many ways can these jobs be assigned to these 10 students?**

a. 5040 b. 2520 c. 300 d. 30

_____ **13.** **Find the middle term in the expansion of $(\frac{x}{2} + 2y^2)^6$.**

a. $20x^3y^5$ b. $5x^3y^6$ c. $20x^3y^6$ d. $\frac{15}{4}\, x^4y^4$

_____ **14.** **A survey of 100 people found that 30 people subscribe to *U.S. News*, 50 subscribe to *Newsweek*, and 15 subscribe to both. How many subscribe to either *U.S. News* or *Newsweek* ?**

a. 65 b. 80 c. 85 d. 95

_____ **15.** **Find $\sum_{n=1}^{\infty} \left(\frac{2}{5}\right)^{n-1}$.**

a. 1 b. $\frac{5}{3}$ c. $\frac{5}{2}$ d. $\frac{3}{2}$

_____ **16.** **Find the 100th term in the sequence: 2, 9, 16, 23, $\cdots$.**

a. 702 b. 15 c. 202 d. 695

_____ **17.** **A bag contains 20 candies: 3 cherry, 4 orange, 7 lemon, and 6 grape. If two candies are selected blindly, what is the probability that they are both the same flavor?**

a. $\frac{1}{2}$ b. 90 c. $\frac{9}{38}$ d. $\frac{9}{40}$

_____ **18.** **If a pair of fair dice is rolled, what are the odds in favor of the sum of the numbers being a 4?**

a. 1 to 11 b. 4 to 11 c. 1 to 12 d. 1 to 18

CHAPTER P

Form A:

1. $-6, -\frac{3}{4}, 0, 1.2, \frac{16}{5}, 5$ **2.** $-6, 0, 5$ **3.** 15 **4.** 4 **5.** -2

6. $\frac{1}{6}$ **7.** $-\frac{1}{8x^2}$ **8.** $b - 4ab + 4a^2b$ **9.** $-9 - 6\sqrt{3}$ **10.** $3xy^3\sqrt[3]{x}$

11. $5 + 12i$ **12.** $1 - i$ **13.** $-x^3 - x^2 + 3$ **14.** $10x^2 - 7xy - 12y^2$

15. $2x^2 + 3x + 3$ **16.** $\frac{5x^2 - 22x - 3}{(x-1)(x+1)(x-6)}$ **17.** $\frac{x+2}{x(x-2)} = \frac{x+2}{x^2 - 2x}$ **18.** $\frac{b-1}{a}$

19. $a(1-2a)(1+2a)(1+4a^2)$ **20.** $(3x+2)(2x-3)$ **21.** $(2x-1)^2(2x+1)$

22. 5×10^3 **23.** \$900 **24.** $P(x) = x(2x+3) = 2x^2 + 3x$

Form B:

1. $-\sqrt{3}, \pi$ **2.** 4 **3.** -8 **4.** $\frac{9}{4}$ **5.** -2 **6.** $-\frac{7}{3}$

7. $2a^3b^4$ **8.** 0 **9.** 1 **10.** $4a^2b^3\sqrt{2a}$ **11.** $5i$ **12.** $-1 + i$

13. $x^3 - x^2 - 6x + 4$ **14.** $12x^2 - xy - y^2$ **15.** $3x^2 - 3x + 2$

16. $\frac{x^2 - 4x + 4}{x^2 - x}$ **17.** $\frac{x+1}{x+3}$ **18.** $\frac{1}{1-2x}$ **19.** $x(x+3)(x-2)$

20. $(x-3)(x-2)(x+2)$ **21.** $2(1-4x)(1+4x+16x^2)$ **22.** 2×10^{-7}

23. 141 feet **24.** $P(x) = \frac{1}{2}x(2x-2) = x^2 - x$

Form C:

1. $\frac{6}{3}$ **2.** $-2, -1.999\cdots, -\frac{2}{5}, 0, \frac{5}{3}, \frac{6}{3}$ **3.** $\frac{4}{9}$ **4.** 32 **5.** 5 **6.** $-\frac{1}{2}$

7. $\frac{9}{2}a^5b^4$ **8.** $5x^2\sqrt[3]{2} - 2x\sqrt[3]{3}$ **9.** $3 - 2\sqrt{2}$ **10.** x^2

11. $\frac{2}{13} - \frac{3}{13}i$ **12.** $9 + 3i$ **13.** $-x^3 + 2x^2 - 5x + 1$ **14.** $a^3b + a^2b^2 - 3a - 3b$

15. $4x^2 + 8x + 5$ **16.** $\frac{x+3}{(x-1)(x+1)} = \frac{x+3}{x^2-1}$ **17.** $\frac{x+2}{x-1}$ **18.** $-\frac{1}{x}$

19. $(4x+5)(2x-3)$ **20.** $2\left(2x - 3y^2\right)\left(2x + 3y^2\right)$ **21.** $(x+1)\left(x^2+1\right)$

22. $(5x+4)\left(25x^2 - 20x + 16\right)$ **23.** 4×10^2 **24.** \$3500 **25.** $P(x) = \frac{1}{2}x^2 - 5x$

Form D:

1. $-\pi, 0.020020002\cdots$ **2.** $-\frac{10}{2}$, 0, $\sqrt{1}$, 6 **3.** $\frac{3}{4}$ **4.** $\frac{25}{13}$ or $1\frac{12}{13}$

5. $\frac{7}{15}$ **6.** 4 **7.** $\frac{x}{2}$ **8.** $a^6 + 4a^3b + 4b^2$ **9.** $2xy^2\sqrt[4]{2x}$

10. $7 - 2\sqrt{10}$ **11.** $2 - i$ **12.** $1 - i$ **13.** $3x^4 - x^3 - 2x + 2$

14. $\frac{9}{4}x^2 + \frac{3}{2}x + \frac{1}{4}$ **15.** $2x^2 - x + 1$ **16.** $\frac{1}{x-1}$ **17.** $x + 3$ **18.** $-x - y$

19. $(3x - 4)(2x + 3)$ **20.** $(a + b)(a^2b - 3)$ **21.** $2x^2(x - 3)^2$

22. $4(2 - 3x)(2 + 3x)$ **23.** 3×10^6 **24.** \$1300 **25.** $\frac{1}{3}x^2 + 2x$

Form E:

1. F **2.** T **3.** T **4.** F **5.** F **6.** F **7.** F **8.** T **9.** F **10.** F

11. d **12.** a **13.** a **14.** b **15.** a **16.** a **17.** d **18.** c **19.** a **20.** b

21. c **22.** b **23.** a **24.** d **25.** d **26.** b **27.** d **28.** c **29.** a **30.** b

Form F:

1. T **2.** F **3.** F **4.** F **5.** F **6.** T **7.** F **8.** F **9.** F **10.** F

11. a **12.** c **13.** d **14.** c **15.** d **16.** a **17.** d **18.** c **19.** b **20.** b

21. d **22.** c **23.** b **24.** b **25.** d **26.** d **27.** c **28.** c **29.** b **30.** a

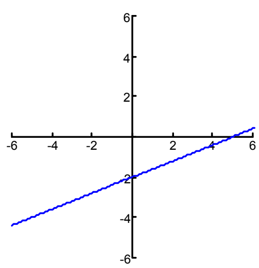
CHAPTER 1.

Form A:

1. $\left\{\frac{29}{5}\right\}$ **2.** $\{\pm 2\}$ **3.** $\{-3\}$ **4.** $\left\{\frac{1}{3}, 3\right\}$

5. $[-2, \infty)$ **6.** $(-\infty, -1) \cup (0, \infty)$

7.



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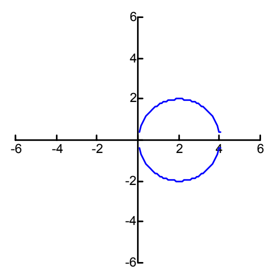


9. 1 **10.** $y = -\frac{1}{2}x + \frac{1}{2}$

11. $\sqrt{34}$ **12.** 10 liters **13.** 13 inches **14.** $x = \frac{2}{c-4}$

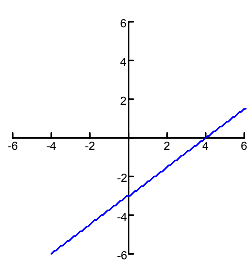
15. disc = 0, 1 real solution **16.** $y = 3.9x - 149.1, 81$ lb.

Form B:

1. $\left\{-\frac{4}{5}\right\}$ **2.** $\left\{\pm\frac{\sqrt{10}}{2}\right\}$ **3.** $\{\pm 4\}$ **4.** $\left\{-\frac{2}{3}, \frac{3}{2}\right\}$

5. $(-1, \infty)$ **6.** $(3, 7)$

7.



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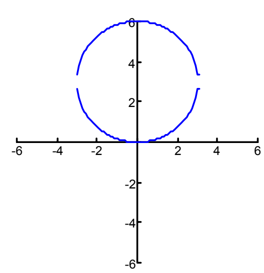


9. -3 **10.** $y = -2x + 6$ **11.** $\sqrt{85}$

12. $6\frac{2}{3}$ quarts **13.** 4 units by 5 units **14.** $y = \frac{1}{x-2}$

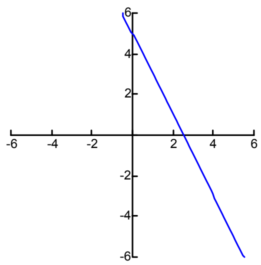
15. disc = -36, 0 real solutions **16.** $y = 3.9x - 149.1, 131.7$ lb.

Form C:

1. $\{-5\}$ **2.** $\{-7, 3\}$ **3.** no solution **4.** $\left\{-\frac{1}{3}, \frac{3}{2}\right\}$

5. $(-\infty, 6]$ **6.** $(-\infty, -2) \cup (3, \infty)$

7.



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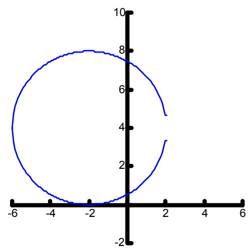


9. $\frac{2}{5}$

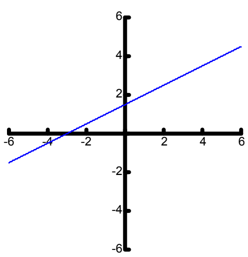
10. $y = 3x + 17$ **11.** $\sqrt{101}$ **12.** 5 liters **13.** 7% **14.** $b = \frac{7}{5}a - 2$

15. disc $= -180$, 0 real solutions **16.** $y = 0.59x + 16.95, 35.83$ in.

Form D:

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

7.



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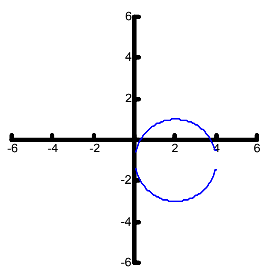


9. $\frac{2}{5}$ **10.** $y = \frac{2}{5}x - \frac{19}{5}$ **11.** $\sqrt{85}$

12. $x = \frac{2y+22}{3}$ **13.** $\frac{-7\pm\sqrt{13}}{2}$ **14.** $(0, -2), (3.5, 0)$

15. $32.50 **16.** $y = 0.59x + 16.95, 46.45$ in.

Form E:

1. a **2.** b **3.** a **4.** c **5.** a **6.** a **7.** a **8.** d
9. a **10.** c **11.** b **12.** c **13.** d **14.** d **15.** b **16.** d

Form F:

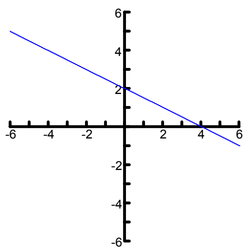
1. c **2.** c **3.** c **4.** b **5.** d **6.** a **7.** d **8.** a
9. b **10.** b **11.** c **12.** b **13.** c **14.** d **15.** a **16.** d

CHAPTER 2

Form A:

1. Yes **2.** No **3.** d: $(-\infty, \infty)$, r: $[0, \infty)$ **4.** d: $[0, \infty)$, r: $[-1, \infty)$

5.



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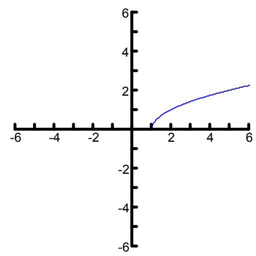

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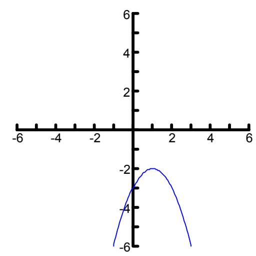
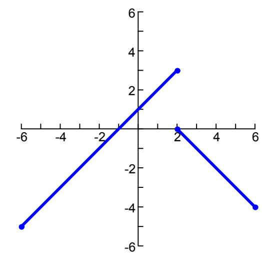


8. open circle at (2, 3)



9. 20 **10.** $\frac{x-1}{2}$ **11.** 30 **12.** 2 **13.** $(-3, \infty)$

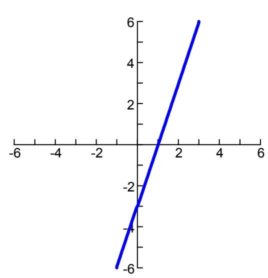
14. symmetric about the origin **15.** $(-\infty, 0) \cup (2, \infty)$ **16.** 10¢ per card

17. $P = 2x + \left(\frac{60}{x}\right)$ **18.** 93

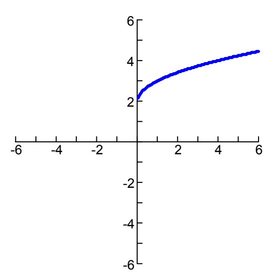
Form B:

1. Yes **2.** No **3.** d: $(-\infty, \infty)$, r: $[1, \infty)$ **4.** d: $[-1, \infty)$, r: $(-\infty, \infty)$

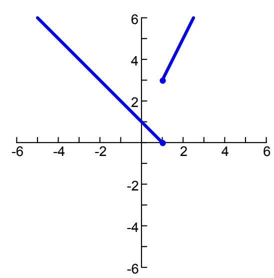
5.



6.



7. open circle at (1, 0)



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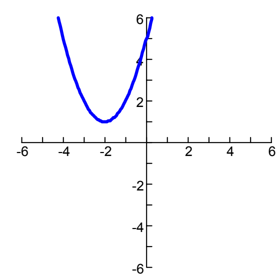


9. 3 **10.** $\frac{x-1}{5}$ **11.** 4 **12.** 5 **13.** $(1, \infty)$

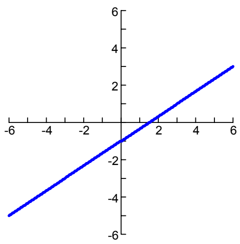
14. not symmetric to x-axis, y-axis, or origin **15.** $(-2, 0)$ **16.** 8¢ per card

17. $A = 5x - x^2$ **18.** 75

Form C:

1. No **2.** No **3.** d: $(-\infty, \infty)$, r: $[2, \infty)$ **4.** d: $(-\infty, 0) \cup (0, \infty)$, r: $(-3, \infty)$

5.



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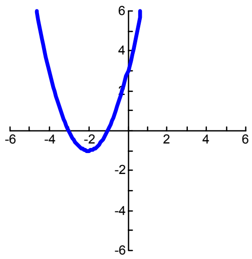

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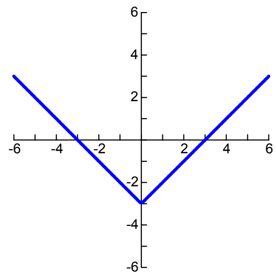

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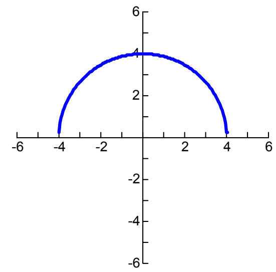


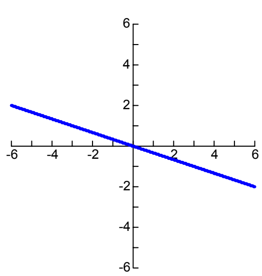
9. $2\sqrt{6}$ **10.** $5 - x^2$, for $x \geq 0$ **11.** 2 **12.** $4x + 2h - 1$ **13.** $(2, \infty)$

14. $(g \circ h)(x)$ **15.** $(-2, 0)$ **16.** $70¢$ per flyer **17.** $A = \frac{1}{2}d^2$ **18.** \$440

Form D:

1. Yes **2.** Yes **3.** d: $[-2, 2]$, r: $[0, 2]$ **4.** d: $(-\infty, \infty)$, r: $(-\infty, -1] \cup (2, \infty)$

5.



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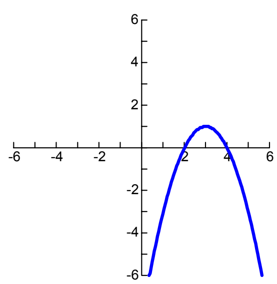

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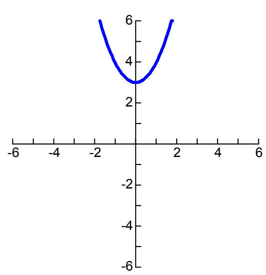

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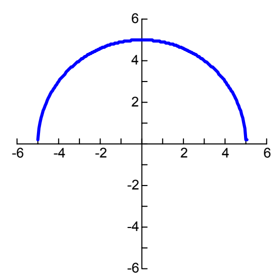


9. 11 **10.** $\frac{x-1}{2}$ **11.** 0 **12.** $2x + h + 1$ **13.** $(-\infty, 0)$ **14.** $(f \circ g)(x)$

15. $(-5, -3)$ **16.** $80¢$ per flyer **17.** $A = \frac{1}{2}d^2$ **18.** \$340

Form E:

1. d **2.** a **3.** b **4.** a **5.** a **6.** b **7.** a **8.** d **9.** a
10. c **11.** a **12.** b **13.** d **14.** c **15.** b **16.** a **17.** c **18.** d

Form F:

1. c **2.** c **3.** a **4.** d **5.** b **6.** d **7.** d **8.** c **9.** b
10. a **11.** c **12.** a **13.** c **14.** b **15.** c **16.** b **17.** d **18.** b

CHAPTER 3

Form A:

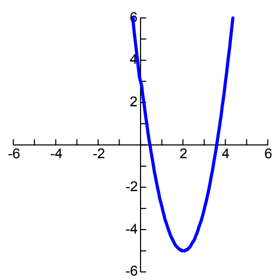
1. $y = 2(x-2)^2 - 5$, vertex: $(2, -5)$, axis: $x = 2$, y-int: $(0, 3)$, x-int: $\left(2 \pm \frac{\sqrt{10}}{2}, 0\right)$,

range: $[-5, \infty)$ **2.** 3 **3.** $(x-2)(2x+1)(x+3)$ **4.** $x^3 + 2x^2 + 4x + 8 = 0$

5. $\pm i$ **6.** 148 ft **7.** $\left\{-42\frac{1}{3}, 41\right\}$ **8.** $\left\{\frac{4}{3}, 4\right\}$ **9.** $x = -1, y = 2$

10. $\{0, \pm 3, \pm 3i\}$ **11.** $\{2i(\text{mult } 2), -2i(\text{mult } 2)\}$ **14.** $\left(-\frac{11}{3}, -2\right)$

1.



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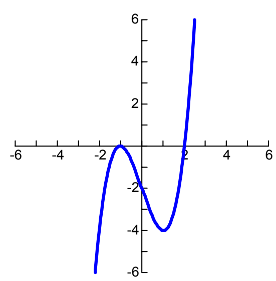

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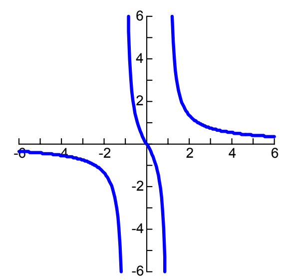


Form B:

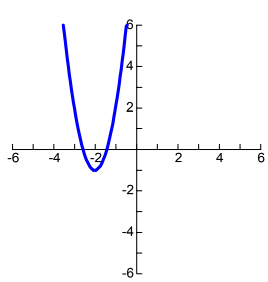
1. $y = 3(x+2)^2 - 1$, vertex: $(-2, -1)$, axis: $x = -2$, y-int: $(0, 11)$, x-int: $\left(-2 \pm \frac{\sqrt{3}}{3}, 0\right)$,

range: $[-1, \infty)$ **2.** -3 **3.** $(x+1)(x-2)^2$ **4.** $x^3 - 5x^2 + 9x - 45 = 0$

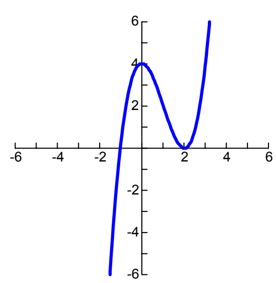
5. $0, 4i, -4i$ **6.** 102 feet **7.** $\{-60, 68\}$ **8.** $\{0, 4\}$ **9.** $x = -2, y = 3$

10. $\{0, \pm 2, \pm 2i\}$ **11.** $\{3i(\text{mult } 2), -3i(\text{mult } 2)\}$ **14.** $\left(2, \frac{5}{2}\right)$

1.



12.



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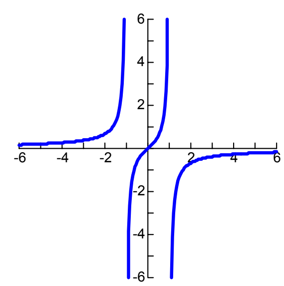


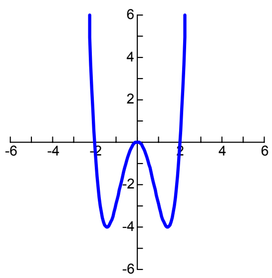
Form C:

1. $-\frac{9}{8}$ **2.** No, remainder $= -48$ **3.** $y = 2(x+3)^2 - 35$ **4.** $x(x-2)^3(x^2+9) = 0$

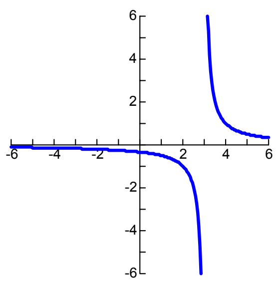
5. 356 feet **6.** 3 pos, 0 neg, 0 imag or 1 pos, 0 neg, 2 imag **7.** $x = -1, y = x - 2$

8. $\{\frac{5}{4}\}$ **9.** $\{-1\}$ **10.** $\{16\}$ **11.** 3, -2(mult 2) **12.** 2, $\pm 3i$

13.



14.



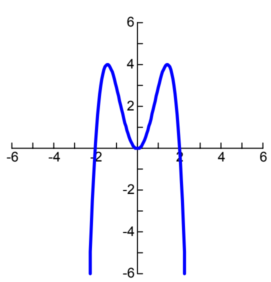
Form D:

1. $-\frac{25}{12}$ **2.** No, remainder $= 24$ **3.** $y = 3(x+2)^2 - 29$ **4.** $x(x+2)^2(x^2+1) = 0$

5. 200 feet **6.** 1 pos, 2 neg, 0 imag or 1 pos, 0 neg, 2 imag **7.** $x = 1, y = 2x - 1$

8. $\{6\}$ **9.** $\{25\}$ **10.** $\{2, 3\}$ **11.** $\{-5, 1, 2\}$ **12.** $\{-3, \frac{1}{2}\text{(mult 2)}\}$

13.



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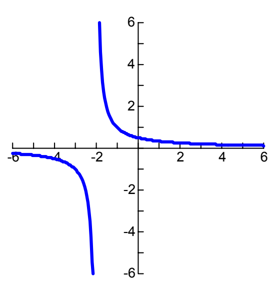


Form E:

1. c **2.** d **3.** c **4.** d **5.** b **6.** c **7.** a **8.** d **9.** a
10. a **11.** d **12.** c **13.** c **14.** d **15.** a **16.** c **17.** b **18.** d

Form F:

1. a **2.** c **3.** a **4.** a **5.** a **6.** d **7.** b **8.** a **9.** b
10. b **11.** a **12.** d **13.** d **14.** d **15.** d **16.** b **17.** c **18.** a

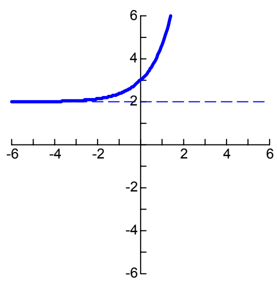
CHAPTER 4

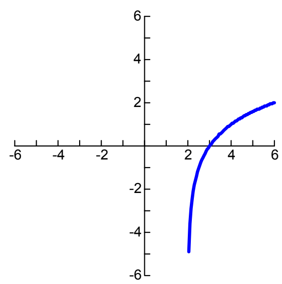
Form A:

1. 2 **2.** 2 **3.** -4 **4.** $\log_3\left(\frac{x(z-1)}{y}\right)$ **5.** $\log(7y^3)$

6. 4 **7.** -1 **8.** 2 **9.** 3.8188 **10.** 6.4031

11. **12.** **13.** -2





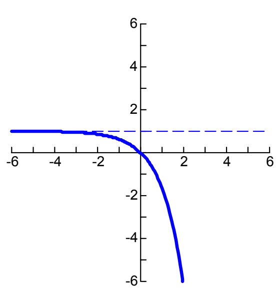
14. 4.3 yrs. **15.** -0.08 **16.** $-3+\log_2(x)$

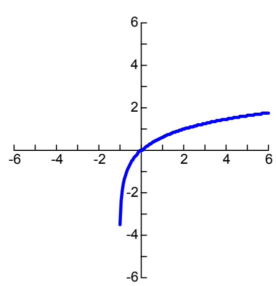
Form B:

1. 3 **2.** -1 **3.** 5 **4.** $\log_2\left(\frac{3x^2}{y}\right)$ **5.** $\log_3\left(\frac{2}{x^2}\right)$

6. 2 **7.** 1 **8.** 3 **9.** 9.6377 **10.** 4.4721

11. **12.** **13.** $-\frac{1}{2}$ **14.** 6.5 yrs.





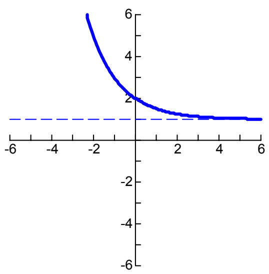
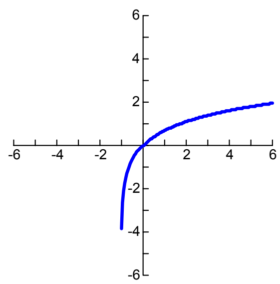
15. -0.11 **16.** $2+\log_3(x)$

Form C:

1. $\log_3(4) = x$ **2.** $e^0 = 1$ **3.** 2 **4.** x **5.** -1

6. -15 **7.** No solution **8.** 1, 4 **9.** 2.5850 **10.** 0.3467

11. **12.** **13.** $\frac{1}{4}$ **14.** 1

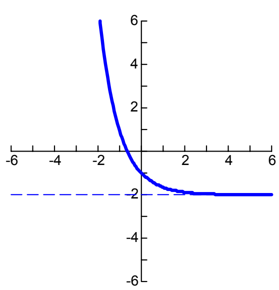
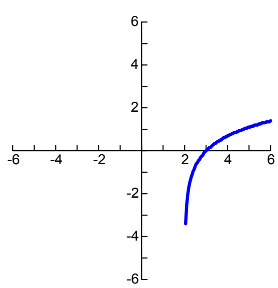
15. $\frac{1}{4}$ **16.** $\frac{1}{2}\ln(3x-5) - \ln(7) - 3\ln(x)$ **17.** -2 **18.** 9.75 grams

Form D:

1. $\log_5(6) = x$ **2.** $10^0 = 1$ **3.** $\frac{1}{2}$ **4.** 4 **5.** -2

6. $\frac{1}{4}$ **7.** $\frac{3}{2}$ **8.** $\frac{6}{5}$ **9.** -0.5350 **10.** 0.2236

11. **12.** **13.** 4 **14.** 1

15. $\frac{1}{16}$ **16.** $\ln(3) + 2\ln(x) - \frac{1}{2}\ln(2x+1)$ **17.** No x-intercept **18.** 9.03 grams

Form E:

1. c **2.** a **3.** b **4.** a **5.** d **6.** b **7.** a **8.** c
9. a **10.** c **11.** c **12.** a **13.** a **14.** d **15.** c **16.** b

Form F:

1. d **2.** d **3.** c **4.** c **5.** a **6.** c **7.** d **8.** b
9. d **10.** c **11.** d **12.** a **13.** c **14.** c **15.** b **16.** a

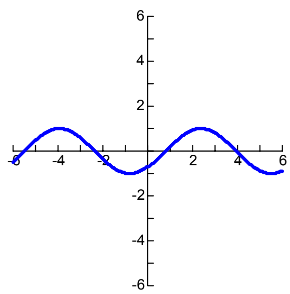
CHAPTER 5

Form A:

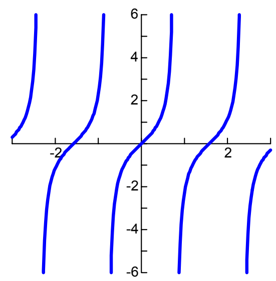
1. $-\frac{1}{2}$ **2.** $\frac{1}{2}$ **3.** $-\sqrt{3}$ **4.** $-\sqrt{2}$ **5.** $\sqrt{2}$ **6.** 0

7. $\frac{\pi}{4}$ **8.** $\frac{5\pi}{6}$ **9.** $-\frac{\pi}{6}$ **10.** $\frac{\pi}{2}$ **11.** $\frac{3}{5}$ **12.** $\frac{5\pi}{6}$

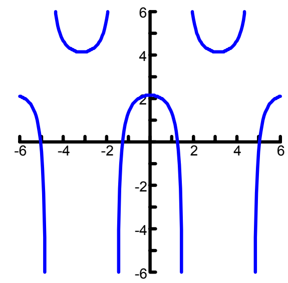
13. period: 2π, amp: 1
range: $[-1, 1]$



14. period: $\frac{\pi}{2}$,
range: $(-\infty, \infty)$



15. period: 2π,
range: $(-\infty, \pi - 1] \cup [1 + \pi, \infty)$



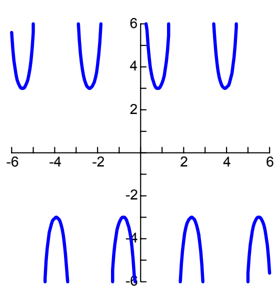
16. $\frac{21\pi}{4}$ cm **17.** $-\frac{5\sqrt{61}}{61}$ **18.** 32 ft **19.** 7.0 mph **20.** $y = -150 \sin\left(\frac{\pi}{6}(x-4)\right) + 650$

Form B:

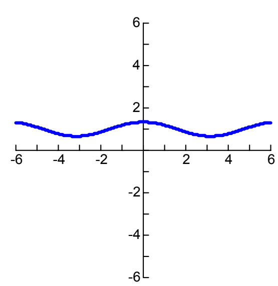
1. $-\frac{\sqrt{3}}{2}$ **2.** $-\frac{\sqrt{3}}{3}$ **3.** $\frac{\sqrt{3}}{2}$ **4.** $\sqrt{2}$ **5.** $\sqrt{2}$ **6.** undefined

7. $\frac{\pi}{6}$ **8.** $\frac{3\pi}{4}$ **9.** $\frac{\pi}{3}$ **10.** 0 **11.** $\frac{12}{13}$ **12.** $-\frac{\pi}{4}$

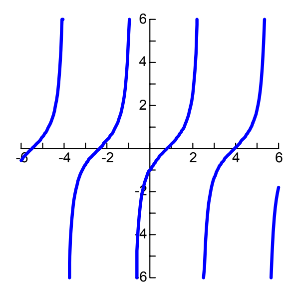
13. period: π,
range: $(-\infty, -3] \cup [3, \infty)$



14. period: 2π, amp: $\frac{1}{3}$
range: $[\frac{2}{3}, \frac{4}{3}]$



15. period: π,
range: $(-\infty, \infty)$



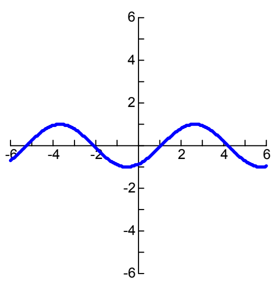
16. $\frac{41\pi}{12}$ cm **17.** $-\frac{3\sqrt{58}}{58}$ **18.** 29 ft **19.** 7.7 mph **20.** $y = -250 \sin\left(\frac{\pi}{6}(x-5)\right) + 650$

Form C:

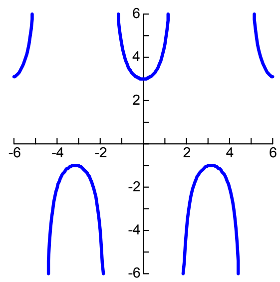
1. $-\frac{1}{2}$ **2.** -1 **3.** -1 **4.** -2 **5.** $\frac{\sqrt{3}}{3}$ **6.** $\sqrt{2}$

7. $\frac{\pi}{4}$ **8.** π **9.** $\frac{\pi}{6}$ **10.** $-\frac{\pi}{6}$ **11.** $\frac{5}{2}$ **12.** $-\frac{\pi}{3}$

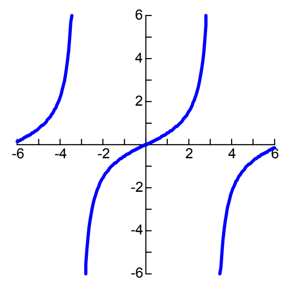
13. period: 2π, amp: 1
range: $[-1, 1]$



14. period: 2π,
range: $(-\infty, -1] \cup [3, \infty)$



15. period: 2π,
range: $(-\infty, \infty)$



16. $-\frac{4\sqrt{65}}{65}$ **17.** $-\frac{2\sqrt{13}}{13}$ **18.** 75.36 ft. **19.** 6205 miles

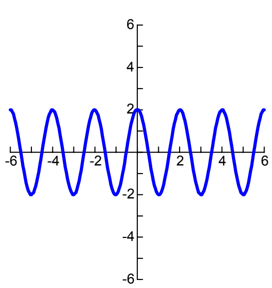
20. $y = -300 \sin\left(\frac{\pi}{6}(x-6)\right) + 600$

Form D:

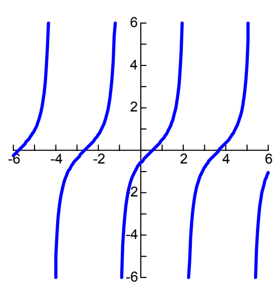
1. $-\frac{\sqrt{3}}{2}$ **2.** $-\frac{\sqrt{3}}{3}$ **3.** 0 **4.** $-\sqrt{2}$ **5.** $\sqrt{3}$ **6.** 2

7. $\frac{2\pi}{3}$ **8.** $\frac{\pi}{2}$ **9.** $-\frac{\pi}{4}$ **10.** $\frac{\pi}{3}$ **11.** $\frac{5}{3}$ **12.** $\frac{\pi}{3}$

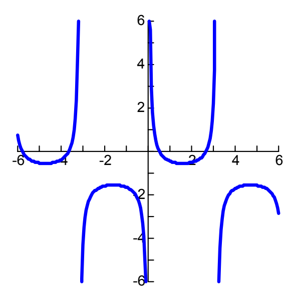
13. period: 2, amp: 2
range: $[-2, 2]$



14. period: π,
range: $(-\infty, \infty)$



15. period: 2π,
range: $(-\infty, -\frac{1}{2} - \frac{\pi}{3}] \cup [\frac{1}{2} - \frac{\pi}{3}, \infty)$



16. $-\frac{2\sqrt{5}}{5}$ **17.** $\frac{\sqrt{17}}{17}$ **18.** 15.3 ft. **19.** 12,409 miles

20. $y = -150 \sin\left(\frac{\pi}{6}(x-5)\right) + 350$

Form E:

1. d **2.** d **3.** b **4.** b **5.** c **6.** d **7.** c **8.** a **9.** b **10.** b
11. c **12.** d **13.** c **14.** d **15.** a **16.** a **17.** b **18.** c **19.** d **20.** a

Form F:

1. c **2.** b **3.** c **4.** d **5.** b **6.** c **7.** b **8.** b **9.** d **10.** d
11. c **12.** c **13.** a **14.** b **15.** d **16.** d **17.** d **18.** d **19.** d **20.** b

CHAPTER 6 (Answers to 5-8 on Forms A-D show one possible approach.)

Form A:

1. 1 **2.** $1 + \cot x$ **3.** $\frac{\sqrt{3}}{3}$ **4.** $\sin x$

5. $\cot\theta \cdot \cos\theta = \frac{\cos\theta}{\sin\theta} \cdot \cos\theta = \frac{\cos^2\theta}{\sin\theta} = \frac{1-\sin^2\theta}{\sin\theta} = \frac{1}{\sin\theta} - \frac{\sin^2\theta}{\sin\theta} = \csc\theta - \sin\theta$

6. $(\cot x + 1)^2 - \csc^2 x = \cot^2 x + 2\cot x + 1 - \csc^2 x = 2\cot x = \frac{2\cos x}{\sin x}$

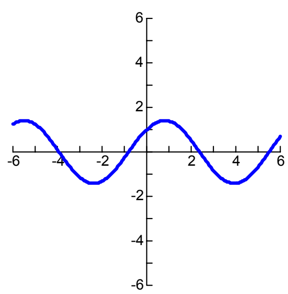
7. $\frac{\csc\beta}{\tan\beta + \cot\beta} = \frac{1/\sin\beta}{\sin\beta/\cos\beta + \cos\beta/\sin\beta} \cdot \frac{\sin\beta\cos\beta}{\sin\beta\cos\beta} = \frac{\cos\beta}{\sin^2\beta + \cos^2\beta} = \cos\beta$

8. $\tan\beta + \frac{\cos\beta}{1+\sin\beta} = \frac{\sin\beta}{\cos\beta} + \frac{\cos\beta}{1+\sin\beta} = \frac{\sin\beta + \sin^2\beta + \cos^2\beta}{\cos\beta(1+\sin\beta)} = \frac{\sin\beta + 1}{\cos\beta(1+\sin\beta)} = \frac{1}{\cos\beta} = \sec\beta$

9. $\{x \mid x = \frac{\pi}{6} + 2\pi k, \text{ or } \frac{5\pi}{6} + 2\pi k, k \text{ an integer}\}$ **10.** $\{x \mid x = \frac{\pi}{8} + \frac{\pi}{2}k, k \text{ an integer}\}$

11. 45°, 225° **12.** 90°, 210°, 330°

13. $y = \sqrt{2}\sin\left(x + \frac{\pi}{4}\right)$ period: 2π, amp: $\sqrt{2}$, phase shift: $\frac{\pi}{4}$ left



14. $\sqrt{3 - 2\sqrt{2}}$ or $\sqrt{2} - 1$ **15.** Show a counterexample, such as $\theta = 45°$:
$\sin 2\theta = \sin 2(45°) = \sin 90° = 1$, whereas $2\sin\theta = 2\sin 45° = 2\left(\frac{\sqrt{2}}{2}\right) = \sqrt{2}$ **16.** $-\frac{1}{4}$

Form B:

1. $\sin x$ **2.** 2 **3.** $2\sec^2 x$ **4.** $\sin x$

5. $\sec\theta - \cos\theta = \frac{1}{\cos\theta} - \frac{\cos^2\theta}{\cos\theta} = \frac{\sin^2\theta}{\cos\theta} = \frac{\sin\theta}{\cos\theta} \cdot \sin\theta = \tan\theta \cdot \sin\theta$

6. $(\tan\theta + 1)^2 = \tan^2\theta + 2\tan\theta + 1 = \sec^2\theta + 2\frac{\sin\theta}{\cos\theta} = \sec^2\theta + 2\sin\theta \cdot \sec\theta$
$= \sec\theta(\sec\theta + 2\sin\theta)$

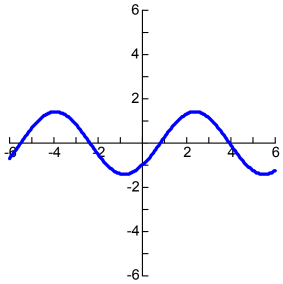
7. $\cos(\beta - 270°) = \cos\beta\cos 270° + \sin\beta\sin 270° = \cos\beta(0) + \sin\beta(-1) = -\sin\beta$

8. $\tan^2 x - \cot^2(-x) + \csc^2 x = \tan^2 x - \cot^2 x + \csc^2 x = \tan^2 x + 1 = \sec^2 x = \sec^2(-x)$

9. $\{\theta \mid \theta = \frac{\pi}{6} + 2\pi k, \text{ or } \frac{11\pi}{6} + 2\pi k, k \text{ an integer}\}$ **10.** $\{x \mid x = \pi k, k \text{ an integer}\}$

11. 0° **12.** 22.5°, 112.5°, 202.5°, 292.5°

13. $y = \sqrt{2}\sin(x - \frac{\pi}{4})$ period: 2π, amp: $\sqrt{2}$, phase shift: $\frac{\pi}{4}$ right **14.** $\frac{\sqrt{2-\sqrt{2}}}{2}$



15. Show a counterexample, such as $\theta = 0°$: $\cos 3\theta = \cos 3(0°) = \cos 0° = 1$,

whereas $3\cos\theta = 3\cos 0° = 3(1) = 3$ **16.** $\frac{1}{4}$

Form C:

1. $\sec x$ **2.** $\cot x$ **3.** $\cos\theta$ **4.** $\sqrt{3}$

5. $\cos^4 x - \sin^4 x = (\cos^2 x - \sin^2 x)(\cos^2 x + \sin^2 x)$
$= (\cos^2 x - (1 - \cos^2 x))(1) = 2\cos^2 x - 1$

6. $\left(\frac{1}{\csc\theta}\right)^2 + (1 + \cos\theta)^2 = \sin^2\theta + 1 + 2\cos\theta + \cos^2\theta = 2 + 2\cos\theta = 2(1 + \cos\theta)$

7. $\cos x \cdot \cos(60° + x) + \sin x \cdot \sin(60° + x) = \cos(x - (60° + x)) = \cos 60° = \frac{1}{2}$

8. $\sin^2\theta + \sin^2\theta(\csc^2\theta + \cot^2\theta) = \sin^2\theta + 1 + \cos^2\theta = 2$

9. $\{x \mid x = \frac{\pi}{3} + 2\pi k, \text{ or } \frac{5\pi}{3} + 2\pi k, k \text{ an integer}\}$ **10.** $\{x \mid x = \frac{\pi}{2} + \pi k, k \text{ an integer}\}$

11. 15°, 75°, 195°, 255° **12.** 19.7°, 79.7°, 139.7°, 199.7°, 259.7°, 319.7°

13. 75° **14.** $-\sqrt{7 - 4\sqrt{3}}$ or $\sqrt{3} - 2$ **15.** $\frac{4\sqrt{21}-6}{25}$ **16.** Odd

Form D:

1. $\csc x$ **2.** $\tan x$ **3.** $\sin\theta$ **4.** $-\sqrt{3}$

5. $\cos^4 x - \sin^4 x = (\cos^2 x - \sin^2 x)(\cos^2 x + \sin^2 x) = (1 - \sin^2 x - \sin^2 x)(1) = 1 - 2\sin^2 x$

6. $\left(\frac{1}{\sec\theta}\right)^2 + (1 + \sin\theta)^2 = \cos^2\theta + 1 + 2\sin\theta + \sin^2\theta = 2 + 2\sin\theta = 2(1 + \sin\theta)$

7. $\cos x \cdot \cos(90° + x) + \sin x \cdot \sin(90° + x) = \cos(x - (90° + x)) = \cos 90° = 0$

8. $\frac{\sec\theta}{\cot\theta + \tan\theta} = \frac{1/\cos\theta}{\cos\theta/\sin\theta + \sin\theta/\cos\theta} \cdot \frac{\sin\theta\cos\theta}{\sin\theta\cos\theta} = \frac{\sin\theta}{\cos^2\theta + \sin^2\theta} = \sin\theta$

9. $\{x \mid x = \frac{\pi}{6} + 2\pi k, \frac{5\pi}{6} + 2\pi k, k \text{ an integer}\}$ **10.** $\{x \mid x = \frac{\pi}{4} + \pi k, \frac{3\pi}{4} + \pi k, \text{ or } \pi\text{k}. k \text{ an integer}\}$

11. 30°, 60°, 210°, 240° **12.** 90°, 233.1°, 306.9° **13.** 75°

14. $-\frac{\sqrt{2-\sqrt{3}}}{2}$ or $\frac{\sqrt{2}-\sqrt{6}}{4}$ **15.** $\frac{-6-4\sqrt{21}}{25}$ **16.** Even

Form E:

1. c **2.** d **3.** a **4.** b **5.** c **6.** a **7.** a **8.** b **9.** d **10.** b

11. c **12.** a **13.** d **14.** a **15.** d **16.** a **17.** a **18.** b **19.** d **20.** b

Form F:

1. b **2.** c **3.** b **4.** a **5.** b **6.** c **7.** b **8.** a **9.** a **10.** a

11. a **12.** c **13.** c **14.** d **15.** a **16.** d **17.** b **18.** c **19.** a **20.** d

CHAPTER 7

Form A:

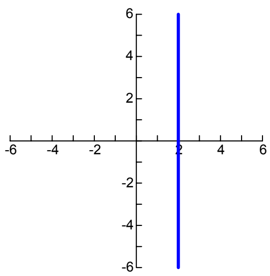
1. 2 Δs: $\beta_1 = 64.8°$, $\gamma_1 = 94.7°$, $c_1 = 34$, $\beta_2 = 115.2°$, $\gamma_2 = 44.3°$, $c_2 = 24$ **2.** No Δs

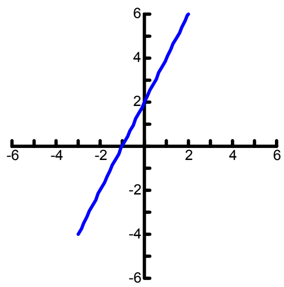
3. magn $= 9$, dir. angle $= 90°$ **4.** magn $= \sqrt{10}$, dir. angle $= 288.4°$

5. $6(\cos 30° + i \sin 30°)$ **6.** $3(\cos 270° + i \sin 270°)$ **7.** $-16 + 0i$ **8.** $-512 + 0i$

9. $(2, 2\sqrt{3})$ **10.** $(\sqrt{2}, -\sqrt{2})$

11. $r \cos\theta = 2$ or $x = 2$ **12.** Endpoints: $(-3, -4)$, $(2, 6)$





13. $\sqrt{2}(\cos 45° + i \sin 45°)$, $\sqrt{2}(\cos 165° + i \sin 165°)$, $\sqrt{2}(\cos 285° + i \sin 285°)$

14. 26.8 sq. in. **15.** $r = 4\cos\theta$ **16.** ground speed = 494 mph, bearing = 317.8°

Form B:

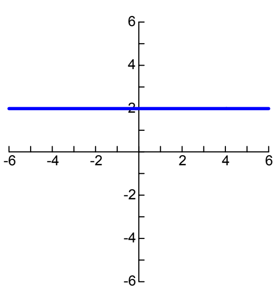
1. No Δs **2.** 2 Δs: $\beta_1 = 61.1°$, $\gamma_1 = 98.4°$, $c_1 = 34$, $\beta_2 = 118.9°$, $\gamma_2 = 40.6°$, $c_2 = 22$

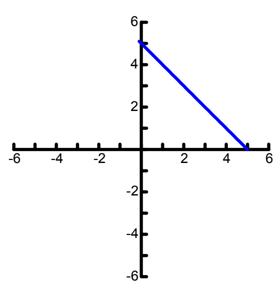
3. magn $= 11$, dir. angle $= 90°$ **4.** magn $= \sqrt{5}$, dir. angle = 333.4°

5. $4(cos\ 330° + i\ sin\ 330°)$ **6.** $5(\cos 90° + i \sin 90°)$ **7.** $0 - 6i$ **8.** $16 + 0i$

9. $(-1, -\sqrt{3})$ **10.** $(-\sqrt{2}, -\sqrt{2})$

11. $r \sin\theta = 2$ or $y = 2$ **12.** Endpoints: $(5, 0)$, $(0, 5)$





13. $\sqrt[3]{4}(\cos 50° + i \sin 50°)$, $\sqrt[3]{4}(\cos 170° + i \sin 170°)$, $\sqrt[3]{4}(\cos 290° + i \sin 290°)$

14. 42.4 sq. in. **15.** $r = -2 \sin \theta$ **16.** ground speed = 505.5 mph, bearing = 317.2°

Form C:

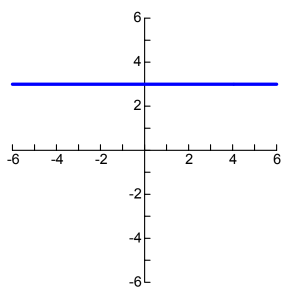
1. No Δs **2.** 2 Δs: $\beta_1 = 76.2°$, $\gamma_1 = 41.8°$, $c_1 = 15.1$, $\beta_2 = 103.8°$, $\gamma_2 = 14.2°$, $c_2 = 5.6$

3. magn $= 10$, dir. angle $= 36.9°$ **4.** magn $= 2$, dir. angle $= 330°$ **5.** $2(\cos 315° + i \sin 315°)$

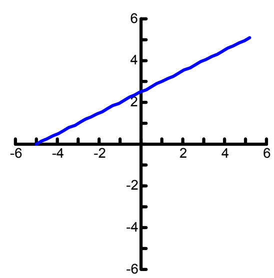
6. $5(\cos 180° + i \sin 180°)$ **7.** $-\sqrt{3} + i$ **8.** $-64 + 0i$

9. $(\sqrt{2}, -\sqrt{2})$ **10.** $(1.721, -2.457)$

11. $r = \frac{3}{\sin \theta}$ or $y = 3$



12. Endpoints: $(-5, 0)$, $(5, 5)$



13. $(\cos 150° + i \sin 150°)$, $(\cos 330° + i \sin 330°)$ **14.** 13.2 miles

15. $r = 2 \cos \theta - 4 \sin \theta$ **16.** 7.6 lbs.

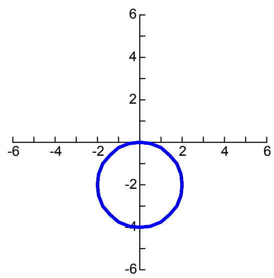
Form D:

1. 2 Δs: $\gamma_1 = 68°$, $\alpha_1 = 47°$, $a_1 = 3.3$, $\gamma_2 = 112°$, $\alpha_2 = 3°$, $a_2 = 0.23$ **2.** 1 Δ: $\beta = 90°$, $\gamma = 60°$, $c = 8\sqrt{3}$ or 13.9 **3.** magn $= 2\sqrt{2}$, dir. angle $= 315°$ **4.** magn $= 6$, dir. angle $= 30°$

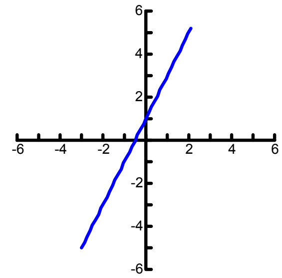
5. $4(\cos 240° + i \sin 240°)$ **6.** $7(\cos 180° + i \sin 180°)$ **7.** $\frac{7}{2} + \frac{7\sqrt{3}}{2}i$

8. $4096 + 0i$ **9.** $(\frac{3\sqrt{3}}{4}, -\frac{3}{4})$ **10.** $(-0.618, 1.902)$

11. $r = -4\sin\theta$ or $x^2 + (y+2)^2 = 4$



12. Endpoints: $(-3, -5)$, $(2, 5)$



13. $\sqrt{2}(\cos 105° + i\sin 105°)$, $\sqrt{2}(\cos 285° + i\sin 285°)$

14. 14.3 miles

15. $r = 2\tan\theta\sec\theta$ or $r = 2\sin\theta\sec^2\theta$

16. $x = \frac{5}{2}t - 3, y = 2t + 1$

Form E:

1. c	**2.** d	**3.** c	**4.** a	**5.** a	**6.** d	**7.** a	**8.** d	**9.** d
10. a	**11.** a	**12.** c	**13.** b	**14.** d	**15.** c	**16.** a	**17.** a	**18.** b

Form F:

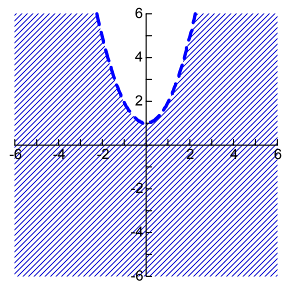
1. d	**2.** a	**3.** d	**4.** a	**5.** a	**6.** c	**7.** b	**8.** b	**9.** a
10. b	**11.** c	**12.** c	**13.** a	**14.** d	**15.** a	**16.** c	**17.** b	**18.** b

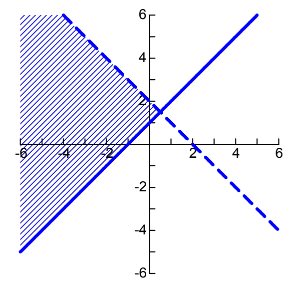
CHAPTER 8

Form A:

1. $\{(0, -1)\}$ **2.** $\left\{\left(\frac{1}{2}, \frac{3}{2}\right)\right\}$ **3.** $\{(1, 2)\}$ **4.** Dependent **5.** Independent

6. $\{(1, 2, 3)\}$ **7.** $\left\{\left(4, \frac{3}{2}\right), (3, 2)\right\}$ **8.** $y < x^2 + 1$ **9.** $x + y < 2,\ y \geq x + 1$



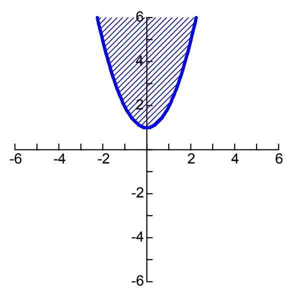


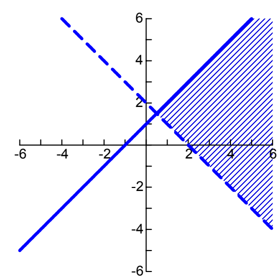
10. $\frac{4}{x^2} - \frac{3}{x^2+1}$ **11.** Lacey is 9 years old, Rachel is 6 years old, Jennifer is 3 years old

Form B:

1. $\{(3, 1)\}$ **2.** $\left\{\left(\frac{1}{2}, \frac{3}{2}\right)\right\}$ **3.** $\{(5, -1)\}$ **4.** Inconsistent **5.** Independent

6. $\{(2, 1, 0)\}$ **7.** $\left\{(1, 1), \left(3, \frac{1}{3}\right)\right\}$ **8.** $y \geq x^2 + 1$ **9.** $x + y > 2,\ y \leq x + 1$



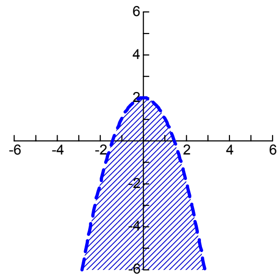


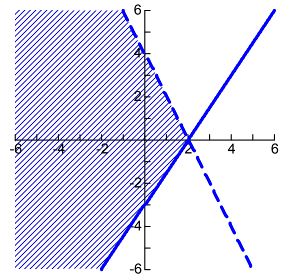
10. $\frac{3}{x} + \frac{2}{x-3} - \frac{1}{x^2}$ **11.** Lacey is 9 years old, Rachel is 9 years old, Jennifer is 3 years old

Form C:

1. $\{(-2, 1)\}$ **2.** $\left\{\left(-\frac{1}{2}, \frac{3}{2}\right)\right\}$ **3.** $\{(5, 4)\}$ **4.** Inconsistent **5.** Independent

6. $\{(-1, 0, 2)\}$ **7.** $\{(4, 3), (3, 4)\}$ **8.** $y < 2 - x^2$ **9.** $2x + y < 4,\ 3x - 2y \leq 6$



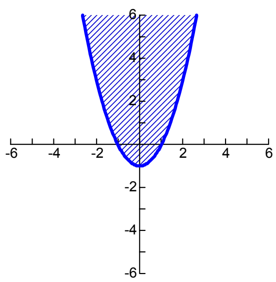


10. $\frac{3}{x} - \frac{1}{x+1} + \frac{2}{(x+1)^2}$ **11.** 15

Form D:

1. $\{(1, 0)\}$ **2.** $\{(2, -1)\}$ **3.** $\left\{\left(\frac{2}{3}, 2\right)\right\}$ **4.** $(3, 0)$ **5.** $\{(3, 1, -1)\}$ **6.** $\{(2, 1)\}$

7. $y \geq x^2 - 1$



8. 17 **9.** $\{(x, 10 - 10x, 8 - 7x) \mid x \text{ is any real number}\}$ or

$\left\{\left(\frac{10-y}{10}, y, \frac{10+7y}{10}\right) \mid y \text{ is any real number}\right\}$ or $\left\{\left(\frac{8-z}{7}, \frac{10z-10}{7}, z\right) \mid z \text{ is any real number}\right\}$

10. The solution is a point of intersection of 3 planes.

Form E:

1. b **2.** a **3.** d **4.** c **5.** a **6.** a **7.** d
8. c **9.** a **10.** a **11.** c **12.** b **13.** d **14.** a

Form F:

1. c **2.** d **3.** a **4.** d **5.** b **6.** b **7.** a
8. b **9.** b **10.** d **11.** b **12.** c **13.** c **14.** b

CHAPTER 9

Form A:

1. $\{(1,2)\}$ **2.** $\{(1,2,3)\}$ **3.** $\begin{bmatrix} 3 & 4 \\ -1 & 1 \end{bmatrix}$ **4.** $\begin{bmatrix} 14 \\ -3 \end{bmatrix}$ **5.** $\begin{bmatrix} \frac{3}{20} & \frac{1}{20} & -\frac{9}{20} \\ \frac{1}{20} & \frac{7}{20} & -\frac{3}{20} \\ \frac{1}{4} & -\frac{1}{4} & \frac{1}{4} \end{bmatrix}$

6. 4 **7.** 20 **8.** Not possible **9.** $\begin{bmatrix} 7 \\ 3 \end{bmatrix}$ **10.** $[4]$ **11.** $\{(5, -4)\}$

12. $x = -2, y = 1$ **13.** inverse matrix = $\begin{bmatrix} \frac{1}{7} & \frac{3}{7} \\ -\frac{2}{7} & \frac{1}{7} \end{bmatrix}$, solution set: $\{(5, 1)\}$

14. Chase: \$28, Jason: \$5.50, Sean: \$15.50

Form B:

1. $\{(1,0)\}$ **2.** $\{(-1,2,-6)\}$ **3.** $\begin{bmatrix} 1 & 4 \\ -1 & -1 \end{bmatrix}$ **4.** Not possible **5.** 20

6. $\begin{bmatrix} \frac{3}{20} & \frac{1}{20} & -\frac{9}{20} \\ \frac{1}{20} & \frac{7}{20} & -\frac{3}{20} \\ \frac{1}{4} & -\frac{1}{4} & \frac{1}{4} \end{bmatrix}$ **7.** 4 **8.** $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$ **9.** $\begin{bmatrix} 1 \\ 4 \end{bmatrix}$ **10.** $[4]$ **11.** $\{(5, 4)\}$

12. $x = \frac{2}{3}, y = \frac{1}{2}$ **13.** $\begin{bmatrix} \frac{2}{19} & \frac{5}{19} \\ -\frac{3}{19} & \frac{2}{19} \end{bmatrix}$ = inverse matrix , solution set: $\{(1, 2)\}$

14. Mary: \$5.50, Joan: \$28.00, Katy: \$15.50

Form C:

1. $\left\{\left(-\frac{1}{2}, \frac{3}{2}\right)\right\}$ **2.** $\{(-1,0,2)\}$ **3.** $\begin{bmatrix} 3 & 6 \\ -2 & 2 \end{bmatrix}$ **4.** $\begin{bmatrix} 19 \\ 4 \end{bmatrix}$ **5.** $\begin{bmatrix} \frac{13}{17} & -\frac{8}{17} & \frac{2}{17} \\ \frac{2}{17} & \frac{4}{17} & -\frac{1}{17} \\ -\frac{6}{17} & \frac{5}{17} & \frac{3}{17} \end{bmatrix}$

6. -4 **7.** 17 **8.** Not possible **9.** $\begin{bmatrix} 10 \\ 5 \end{bmatrix}$ **10.** $[7]$ **11.** $\left\{\left(\frac{6}{11}, \frac{13}{11}\right)\right\}$

12. $x = 1, y = 1$ **13.** inverse matrix = $\begin{bmatrix} \frac{2}{5} & \frac{1}{5} \\ -\frac{3}{5} & \frac{1}{5} \end{bmatrix}$, solution set: $\{(5, 1)\}$

14. Luke: \$3, Kim: \$4, Joe: \$8

Form D:

1. $\{(1, 1)\}$ **2.** $\{(3, 0, 2)\}$ **3.** $\begin{bmatrix} -1 & 4 \\ -2 & 6 \end{bmatrix}$ **4.** Not possible **5.** 17

6. $\begin{bmatrix} \frac{13}{17} & -\frac{8}{17} & \frac{2}{17} \\ \frac{2}{17} & \frac{4}{17} & -\frac{1}{17} \\ -\frac{6}{17} & \frac{5}{17} & \frac{3}{17} \end{bmatrix}$ **7.** 14 **8.** $\begin{bmatrix} -3 \\ -2 \end{bmatrix}$ **9.** $\begin{bmatrix} 0 \\ 5 \end{bmatrix}$ **10.** $[7]$ **11.** $\left\{\left(\frac{15}{13}, \frac{36}{13}\right)\right\}$

12. $x = 1, y = 0$ **13.** $\begin{bmatrix} 2 & -3 \\ -1 & 2 \end{bmatrix}$ = inverse matrix, solution set: $\{(-2, 1)\}$

14. Mark: 36, Joe: 10, Tim: 8

Form E:

1. c **2.** a **3.** b **4.** a **5.** b **6.** a **7.** d **8.** a
9. a **10.** d **11.** a **12.** a **13.** a **14.** c **15.** b **16.** c

Form F:

1. a **2.** c **3.** a **4.** c **5.** c **6.** c **7.** a **8.** c
9. a **10.** c **11.** c **12.** b **13.** a **14.** d **15.** c **16.** a

CHAPTER P

Form A:

1. $-6, -\frac{3}{4}, 0, 1.2, \frac{16}{5}, 5$ **2.** $-6, 0, 5$ **3.** 15 **4.** 4 **5.** -2

6. $\frac{1}{6}$ **7.** $-\frac{1}{8x^2}$ **8.** $b - 4ab + 4a^2b$ **9.** $-9 - 6\sqrt{3}$ **10.** $3xy^3\sqrt[3]{x}$

11. $5 + 12i$ **12.** $1 - i$ **13.** $-x^3 - x^2 + 3$ **14.** $10x^2 - 7xy - 12y^2$

15. $2x^2 + 3x + 3$ **16.** $\frac{5x^2 - 22x - 3}{(x-1)(x+1)(x-6)}$ **17.** $\frac{x+2}{x(x-2)} = \frac{x+2}{x^2 - 2x}$ **18.** $\frac{b-1}{a}$

19. $a(1-2a)(1+2a)(1+4a^2)$ **20.** $(3x+2)(2x-3)$ **21.** $(2x-1)^2(2x+1)$

22. 5×10^3 **23.** \$900 **24.** $P(x) = x(2x+3) = 2x^2 + 3x$

Form B:

1. $-\sqrt{3}, \pi$ **2.** 4 **3.** -8 **4.** $\frac{9}{4}$ **5.** -2 **6.** $-\frac{7}{3}$

7. $2a^3b^4$ **8.** 0 **9.** 1 **10.** $4a^2b^3\sqrt{2a}$ **11.** $5i$ **12.** $-1 + i$

13. $x^3 - x^2 - 6x + 4$ **14.** $12x^2 - xy - y^2$ **15.** $3x^2 - 3x + 2$

16. $\frac{x^2 - 4x + 4}{x^2 - x}$ **17.** $\frac{x+1}{x+3}$ **18.** $\frac{1}{1-2x}$ **19.** $x(x+3)(x-2)$

20. $(x-3)(x-2)(x+2)$ **21.** $2(1-4x)(1+4x+16x^2)$ **22.** 2×10^{-7}

23. 141 feet **24.** $P(x) = \frac{1}{2}x(2x-2) = x^2 - x$

Form C:

1. $\frac{6}{3}$ **2.** $-2, -1.999\cdots, -\frac{2}{5}, 0, \frac{5}{3}, \frac{6}{3}$ **3.** $\frac{4}{9}$ **4.** 32 **5.** 5 **6.** $-\frac{1}{2}$

7. $\frac{9}{2}a^5b^4$ **8.** $5x^2\sqrt[3]{2} - 2x\sqrt[3]{3}$ **9.** $3 - 2\sqrt{2}$ **10.** x^2

11. $\frac{2}{13} - \frac{3}{13}i$ **12.** $9 + 3i$ **13.** $-x^3 + 2x^2 - 5x + 1$ **14.** $a^3b + a^2b^2 - 3a - 3b$

15. $4x^2 + 8x + 5$ **16.** $\frac{x+3}{(x-1)(x+1)} = \frac{x+3}{x^2-1}$ **17.** $\frac{x+2}{x-1}$ **18.** $-\frac{1}{x}$

19. $(4x+5)(2x-3)$ **20.** $2(2x-3y^2)(2x+3y^2)$ **21.** $(x+1)(x^2+1)$

22. $(5x+4)(25x^2 - 20x + 16)$ **23.** 4×10^2 **24.** \$3500 **25.** $P(x) = \frac{1}{2}x^2 - 5x$

Form D:

1. $-\pi, 0.020020002\cdots$ **2.** $-\frac{10}{2}$, 0, $\sqrt{1}$, 6 **3.** $\frac{3}{4}$ **4.** $\frac{25}{13}$ or $1\frac{12}{13}$

5. $\frac{7}{15}$ **6.** 4 **7.** $\frac{x}{2}$ **8.** $a^6+4a^3b+4b^2$ **9.** $2xy^2\sqrt[4]{2x}$

10. $7-2\sqrt{10}$ **11.** $2-i$ **12.** $1-i$ **13.** $3x^4-x^3-2x+2$

14. $\frac{9}{4}x^2+\frac{3}{2}x+\frac{1}{4}$ **15.** $2x^2-x+1$ **16.** $\frac{1}{x-1}$ **17.** $x+3$ **18.** $-x-y$

19. $(3x-4)(2x+3)$ **20.** $(a+b)(a^2b-3)$ **21.** $2x^2(x-3)^2$

22. $4(2-3x)(2+3x)$ **23.** 3×10^6 **24.** $1300 **25.** $\frac{1}{3}x^2+2x$

Form E:

1. F **2.** T **3.** T **4.** F **5.** F **6.** F **7.** F **8.** T **9.** F **10.** F

11. d **12.** a **13.** a **14.** b **15.** a **16.** a **17.** d **18.** c **19.** a **20.** b

21. c **22.** b **23.** a **24.** d **25.** d **26.** b **27.** d **28.** c **29.** a **30.** b

Form F:

1. T **2.** F **3.** F **4.** F **5.** F **6.** T **7.** F **8.** F **9.** F **10.** F

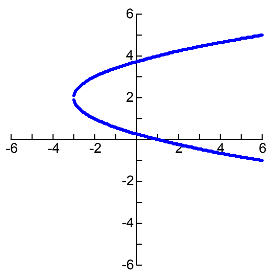
11. a **12.** c **13.** d **14.** c **15.** d **16.** a **17.** d **18.** c **19.** b **20.** b

21. d **22.** c **23.** b **24.** b **25.** d **26.** d **27.** c **28.** c **29.** b **30.** a

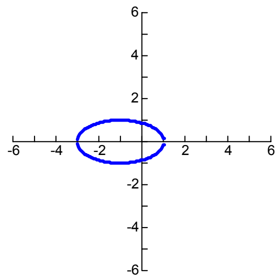
CHAPTER 10

Form A:

1.



2.



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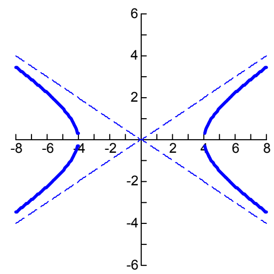

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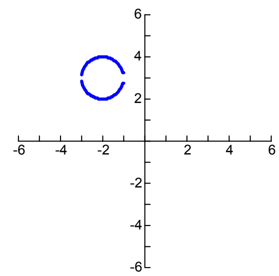


5. $(x-2)^2+(y+1)^2=16$ **6.** $y=\frac{1}{4}(x-2)^2$ **7.** $\frac{x^2}{9}+\frac{y^2}{8}=1$ **8.** $\frac{y^2}{4}-\frac{x^2}{12}=1$

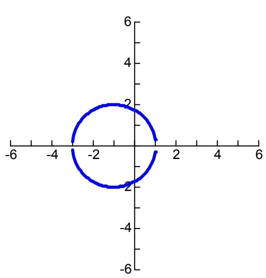
9. center: $\left(-3,\frac{3}{2}\right)$; radius $=\frac{\sqrt{61}}{2}$ **10.** vertex: $\left(\frac{1}{4},-\frac{25}{8}\right)$; focus: $\left(\frac{1}{4},-3\right)$; directrix: $y=-\frac{13}{4}$

11. $y=-\frac{3}{2}x+\frac{3}{2}$, $y=\frac{3}{2}x-\frac{3}{2}$ **12.** foci: $\left(0,2\sqrt{10}\right)$, $\left(0,-2\sqrt{10}\right)$;

length of major axis is 14; length of minor axis is 6

Form B:

1.



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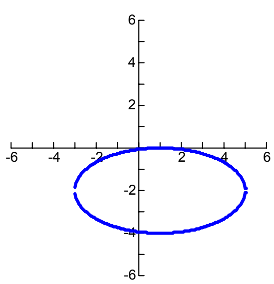
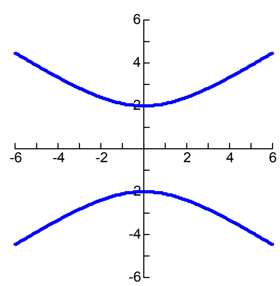
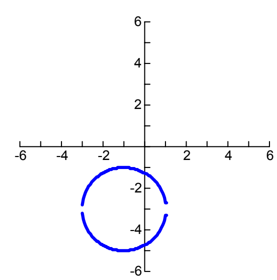


3.



4.



5. $(x-1)^2+(y+2)^2=4$ **6.** $x=\frac{1}{8}(y-1)^2$ **7.** $\frac{x^2}{10}+\frac{y^2}{9}=1$ **8.** $\frac{x^2}{4}-\frac{y^2}{21}=1$

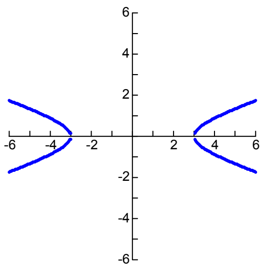
9. center: $\left(4,-\frac{5}{2}\right)$; radius $=\frac{\sqrt{77}}{2}$ **10.** vertex: (1 , 2); focus: (1 , 1); directrix: $y=3$

11. $y=-\frac{4}{5}x-1$, $y=\frac{4}{5}x-1$ **12.** foci: $(\pm 4, 0)$; length of major axis is 10;

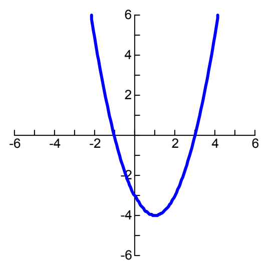
length of minor axis is 6

Form C:

1.



2.



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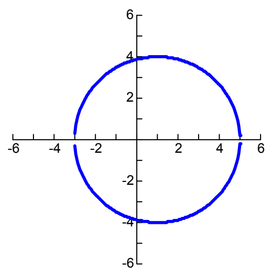

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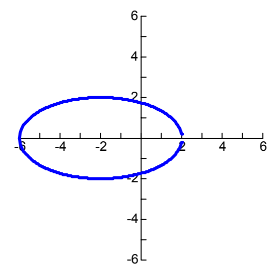


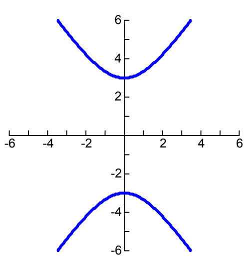
5. $(x-2)^2+(y-3)^2=25$ **6.** $y=\frac{1}{8}(x-3)^2$ **7.** $\frac{x^2}{33}+\frac{y^2}{49}=1$ **8.** $\frac{x^2}{49}-y^2=1$

9. c: $\left(-2, \frac{5}{2}\right)$; r = $\frac{3\sqrt{5}}{2}$ **10.** v: (2 , 1); f: (2 , 3); dirx: $y=-1$ **11.** $y=-\frac{9}{8}x$, $y=\frac{9}{8}x$

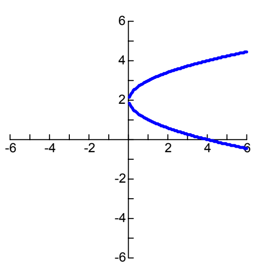
12. 30°

Form D:

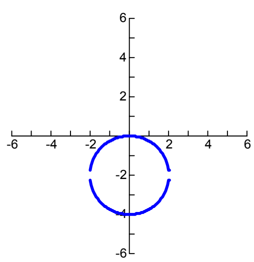
1.



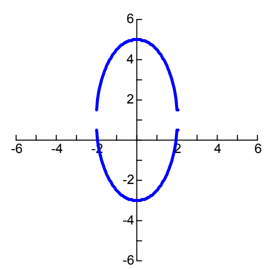
2.



3.



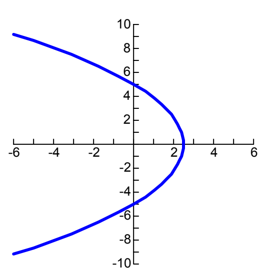
4.



5. $(x-2)^2+(y-\frac{9}{2})^2=\frac{5}{4}$ **6.** $x=\frac{1}{8}(y-3)^2+2$ **7.** $\frac{x^2}{4}+\frac{y^2}{40}=1$ **8.** $\frac{y^2}{25}-\frac{x^2}{9}=1$

9. center: (0, 4); radius = 4 **10.** vertex: (1 , 0); focus: (2 , 0); directrix: $x=0$

11. $y=-\frac{5}{7}x$, $y=\frac{5}{7}x$ **12.** parabola



Form E:

1. c **2.** a **3.** b **4.** b **5.** a **6.** c **7.** c **8.** a
9. d **10.** c **11.** a **12.** b **13.** a **14.** c **15.** b **16.** a

Form F:

1. a **2.** d **3.** a **4.** a **5.** b **6.** a **7.** b **8.** b
9. d **10.** d **11.** a **12.** a **13.** c **14.** a **15.** b **16.** a

CHAPTER 11

Form A:

1. $\frac{1}{3}, 1, \frac{5}{3}$ **2.** $-3, -5, -2, 3$ **3.** n^3 **4.** $3 \cdot 2^{n-1}$

5. $-3 + 5(n-1)$ or $5n - 8$ **6.** 2300 **7.** 65.34 **8.** 98 **9.** 34,650

10. -392 **11.** $x^4 - 12x^3y + 54x^2y^2 - 108xy^3 + 81y^4$ **12.** $\sum_{j=0}^{25} \binom{25}{j} m^{25-j}n^j$

13. 1 to 11 **14.** 6,471,002 **15.** $\frac{1}{720}$ **16.** Induction

Form B:

1. $\frac{4}{3}, \frac{5}{3}, 2$ **2.** 7, 9, 16, 25 **3.** n^2 **4.** $4 \cdot 3^{n-1}$

5. $-2 + 4(n-1)$ or $4n - 6$ **6.** 5.84 **7.** 2261 **8.** 100 **9.** 90,720

10. -384 **11.** $16x^4 + 32x^3y + 24x^2y^2 + 8xy^3 + y^4$ **12.** $\sum_{j=0}^{20} \binom{20}{j} a^{20-j}b^j$

13. 1 to 8 **14.** 487,635 **15.** $\frac{1}{5040}$ **16.** Induction

Form C:

1. 5, 3, 1 **2.** 10, 20, 200, 4000 **3.** n^4 **4.** $3 + 4(n-1)$ or $4n - 1$

5. $2 \cdot 4^{n-1}$ or 2^{2n-1} **6.** 1 **7.** -4950 **8.** 89 **9.** 60 **10.** -195

11. $a^5 + 10a^4b + 40a^3b^2 + 80a^2b^3 + 80ab^4 + 32b^5$ **12.** $\sum_{j=0}^{18} \binom{18}{j} (2m)^{18-j}n^j$

13. $\frac{1081}{270{,}725}$ **14.** 4,187,106 **15.** $\frac{9}{38}$ **16.** Induction

Form D:

1. $2, 6, 18$ **2.** $6, 18, 108, 1944$ **3.** 2^{3n-1} **4.** $-3(-2)^{n-1}$ or $(-1)^n 3 \cdot 2^{n-1}$

5. $5+3(n-1)$ or $3n+2$ **6.** 1102 **7.** 3 **8.** 95 **9.** 72

10. -191 **11.** $32a^5 - 80a^4b + 80a^3b^2 - 40a^2b^3 + 10ab^4 - b^5$ **12.** $\sum_{j=0}^{24} \binom{24}{j} a^{24-j}(2b)^j$

13. $\frac{47}{270{,}725}$ **14.** $15{,}890{,}700$ **15.** $\frac{9}{38}$ **16.** Induction

Form E:

1. d **2.** a **3.** b **4.** a **5.** c **6.** a **7.** b **8.** c **9.** b
10. a **11.** c **12.** a **13.** a **14.** d **15.** c **16.** b **17.** d **18.** c

Form F:

1. c **2.** d **3.** d **4.** c **5.** b **6.** c **7.** c **8.** a **9.** b
10. c **11.** b **12.** b **13.** c **14.** a **15.** b **16.** d **17.** c **18.** a