FINAL EXAM REVIEW

Name_____

<u>**Chapter 7**</u> **Due Monday 6/4/18**

Determine whether each function represents exponential growth or decay.
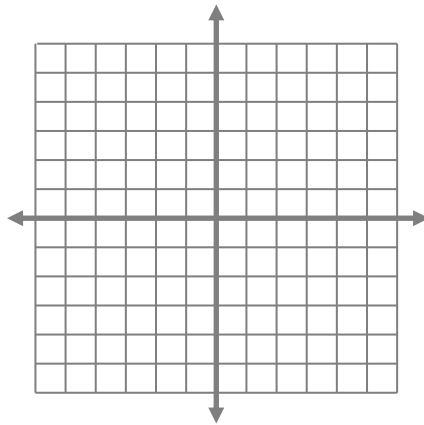
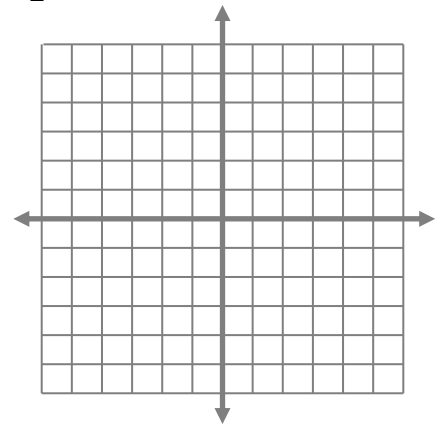1. $y = 5(.6)^x$

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

3. $y = 5 \cdot 4^{-x}$

Describe the shifts of the following exponential equations from its parent function and then graph. Then, identify the functions domain and range.
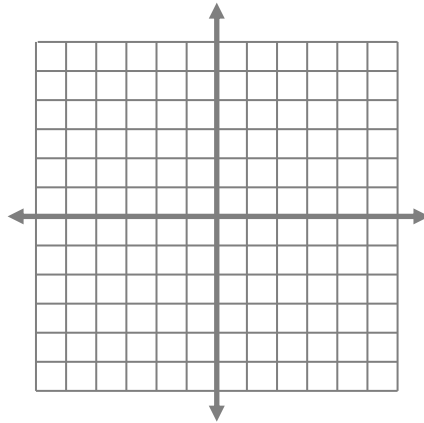
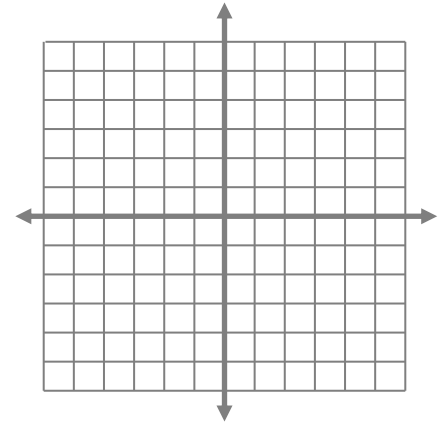4. $y = -2\left(\dfrac{1}{2}\right)^{x-3}$

5. $y = .25(4)^{x+1} - 2$

6. $y = \log_2(x + 3)$

7. $y = \log_3(x - 1) + 2$

Write each expression in logarithmic form.

8. $2^7 = 128$

9. $8^{-2} = \dfrac{1}{64}$

10. $e^{15} = x$

11. $e^{-5x} = 0.2$

Write each equation in exponential form.

12. $\log_{15} 225 = 2$

13. $\log_4 32 = \dfrac{5}{2}$

14. $\ln 20 = x$

15. $\ln 0.0002 = x$

Evaluate each expression.

16. $\log_5 25$ 17. $\log_4 \dfrac{1}{64}$ 18. $7^{\log_7 x}$ 19. $e^{\ln 3}$ 20. $\ln e^y$

Solve each equation. Check your solutions.

21. $\log_3 x = 5$ 22. $\ln x = 2$ 23. $\log_6 216 = x$

24-27, use $\log_5 3 \approx 0.6826$ **and** $\log_5 4 \approx 0.8614$ **to evaluate each expression.**

24. $\log_5 12$ 25. $\log_5 \dfrac{81}{5}$

26. $\log_5 \dfrac{9}{16}$ 27. $\log_5 144$

Use the Change of Base formula to evaluate.

28. $\log_5 7$ 29. $\log_9 4$

Expand the following logarithms.

30. $\log_3 4x^2$ 31. $\ln \dfrac{3x^3}{2y}$

Condense the following logarithms.

32. $\log_5 24 - \log_5 6$ 33. $\log_8 6 + 2\log_8 3$

Solve each equation or inequality. Check your solution.

34. $3^{3x-5} = 81$ 35. $2^{3n-1} = \left(\dfrac{1}{8}\right)^n$ 36. $9^{2x-1} = 27^{x+4}$

Solve each equation. Check your solutions.

37. $5^x + 3 = 12$

38. $7^{2x-1} + 5 = 27$

39. $e^x = 5$

40. $2e^x - 1 = 11$

41. $\log_6(4x + 12) = 2$

42. $\log_3(x + 2) = \log_3(3x)$

43. $\log_4 5 + \log_4 x = \log_4 60$

44. $\log_5 y - \log_5 8 = \log_5 1$

45. $3\log_8 2 - \log_8 4 = \log_8 b$

46. $\log_3 x - \log_3(x + 2) = 1$

47. $\log_2(x - 2) + \log_2(x + 1) = 2$

48. $\ln 8x = 3$

49. $\ln(x + 3) = 1$

Find the inverse.

50. $y = 4^x$ 51. $y = \ln(x+3)$ 52. $y = \log_8 x$

53. A computer system depreciates at a rate of 6.5% per year. If the computer system originally cost $4000, how long would it take for it to be worth half its value?

54. Suppose you deposit $1000 in an account paying 5% annual interest compounded continuously.
     a. What is the balance after 10 years?

     b. How long will it take for the balance in your account to reach $1500?

55. Suppose you deposit $100 in an account paying 3.5% interest compounded continuously. How long will it take for your money to double?

56. A cup of coffee contains 130 milligrams of caffeine. If caffeine is eliminated from the body at a rate of 11% per hour, how long will it take for half of this caffeine to be eliminated from a person's body?
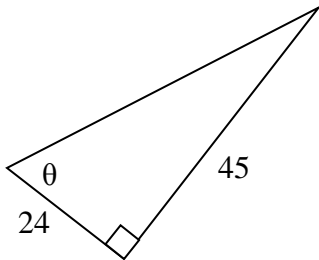
57. You're off to college! You buy a computer for $2500. It is expected to depreciate at a rate of 20% per year. What will be the value of the computer in 2 years?

58. A computer system depreciates at an average rate of 4% per month. If the value of the computer system was originally $12000, in how many months is it worth $7350?

59. A piece of machinery valued at $250,000 depreciates at a fixed rate of 12% per year. After how many years will the value have depreciated to $100,000?

60. The Miller's bought a condominium for $185,000. Assuming that the value of the condo will appreciate at approximately 5% a year, how much will the condo be worth in 7 years?

61. The population of a city of one million people is increasing at a rate of 3% per year. If the population continues to grow at this rate, in how many years will the population have doubled?

CHAPTER 13 – TRIGONOMETRY **Due Tuesday 6/5/18**

Note: always round sides to the nearest tenth and angles to the nearest degree.

Find the values of the six trigonometric functions for angle θ.

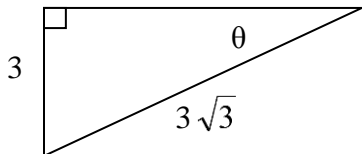1.

1. $\sin\theta$ _____

    $\cos\theta$ _____

    $\tan\theta$ _____

    $\csc\theta$ _____

    $\sec\theta$ _____

    $\cot\theta$ _____

2.

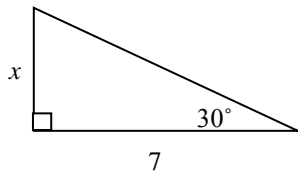2. $\sin\theta$ _____

    $\cos\theta$ _____

    $\tan\theta$ _____

    $\csc\theta$ _____

    $\sec\theta$ _____
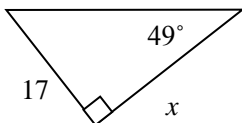
    $\cot\theta$ _____

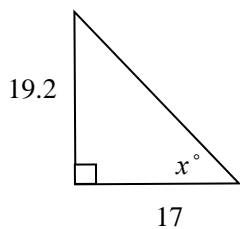*Write an equation involving sin, cos, or tan that can be used to find x, then solve.*

3.

3._____

4.

4._____

5.

5._____

Solve the _right_ triangle, ΔABC by using the given measurements.

6. $A = 35°$, $a = 12$

7. $b = 52$, $c = 95$

```
A
|\
| \
b|  \  c
|   \
|____\
C  a   B
```
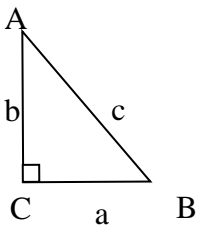
6.   B =

b =

c =

7.   a =

A =

B =

Draw an angle with the given measure in standard position.

8.   210°
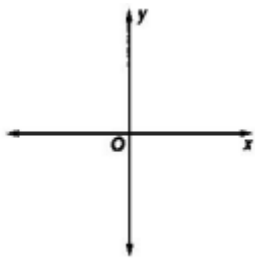
9. $-\dfrac{28\pi}{9}$
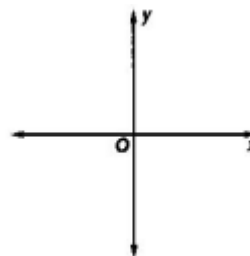
Rewrite each degree measure in radians and each radian measure in degrees.

10. $-18°$

11. $870°$

10._____

11._____

12. $\dfrac{5\pi}{2}$

13. $-\dfrac{7\pi}{12}$

12._____

13._____

Find one angle with positive measure and one angle with negative measure coterminal with each angle.

14. 80°

15. $\dfrac{2\pi}{5}$

14._____

15._____

16. $-93°$

17. $-\dfrac{5\pi}{12}$

16._____

17._____

Find the reference angle for the angle with the given measure.

18. $-210°$

19. $\dfrac{13\pi}{3}$

18._____

19._____

Find the exact value of each trigonometric function.

20. $\tan 135°$

21. $\cot\left(-90°\right)$

20._____

21._____

22. $\tan\dfrac{5\pi}{3}$

23. $\csc\left(-\dfrac{3\pi}{4}\right)$

22._____

23._____

24. Solve $\Delta\,ABC$ if $A = 50°$, $B = 30°$, and $c = 9$.

24. C = _____

a = _____

b = _____

Determine whether each triangle has one, two or no solutions, then solve each triangle.

25. $A = 29°$, $a = 6$, $b = 13$

25._____

_____

26. $A = 66°$, $a = 12$, and $b = 7$

26._____

_____

27. $A = 45°$, $a = 15$, and $b = 18$

27._____

_____

Solve the following triangles.

28.
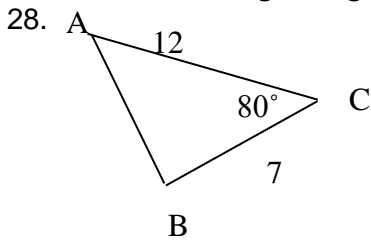
28._____

_____

29. $a = 16$, $b = 20$, $C = 54°$

29._____

_____

Solve the following triangles completely.

30. $a = 8$, $b = 6$, $c = 9$

30._____

_____

31. $B = 47°$, $C = 112°$, $b = 13$

31._____

_____

Find the exact value of each function.

32. $\cos \dfrac{7\pi}{4}$

33. $\sin\left(-330°\right)$

32._____

33._____

34. $\sin\left(-\dfrac{2\pi}{3}\right)$

35. $\cos \ 840°$

34._____

35._____

Solve each equation by finding the value of x.

36. $Sin^{-1}(-1) = x$

37. $x = Arc\tan 0$

36._____

37._____

38. $x = Arc\cos \dfrac{1}{2}$

39. $Arc\tan\left(-\dfrac{\sqrt{3}}{3}\right)$

38._____

39._____

Find each value. Write angle measures in radians.

40. $Sin^{-1}\dfrac{\sqrt{2}}{2}$

41. $Tan^{-1}\left(-\sqrt{3}\right)$

40._____

41._____

Find the value of each expression.

42. $\cos\theta$, if $\tan\theta = -\dfrac{4}{3}$; $90° < \theta < 180°$
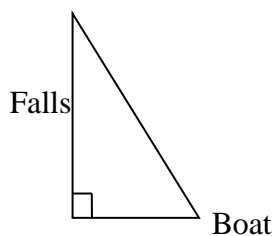
42._____

43. $\sin\theta$, if $\cos\theta = \dfrac{6}{7}$; $270° < \theta < 360°$

43._____

44. In a sightseeing boat near the base of the Horseshoe Falls at Niagara Falls, a passenger estimates the angle of elevation to the top of the Falls to be 35°. If the Horseshoe Falls are 173 feet high, what is the distance from the boat to the base of the falls?

44._____

Falls

Boat

1. Given, $y = 4\sin\dfrac{1}{2}\theta$ find the following in radians:

   a. Amplitude   1 a._____

   b. Period   b._____

   c. Graph one positive and one negative period. (be sure to label graph)

2. Given, $y = \dfrac{1}{2}\cos 4\theta$ find the following in radians:

   a. Amplitude   2 a._____
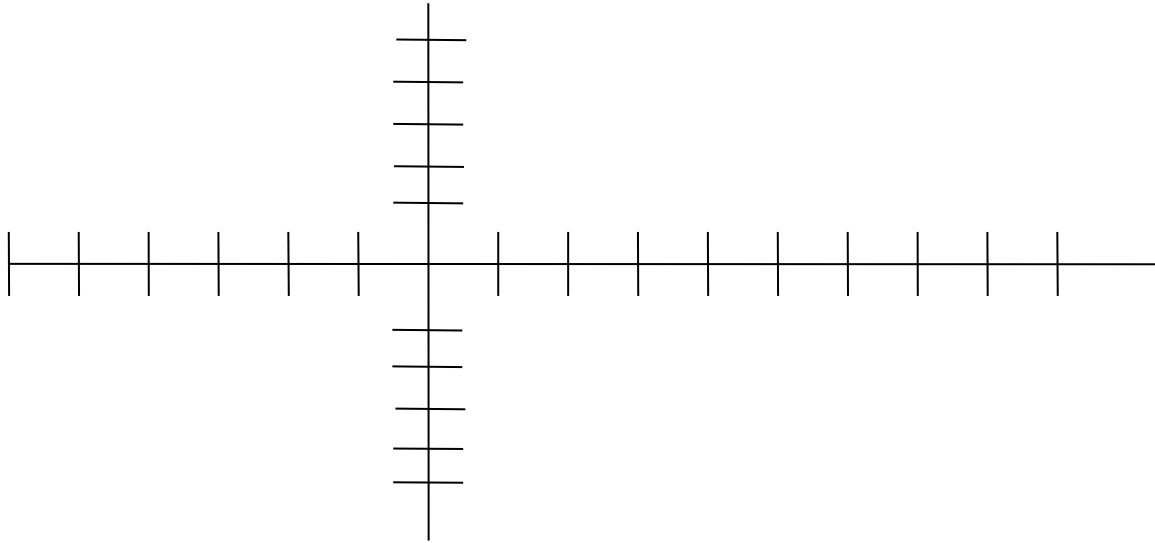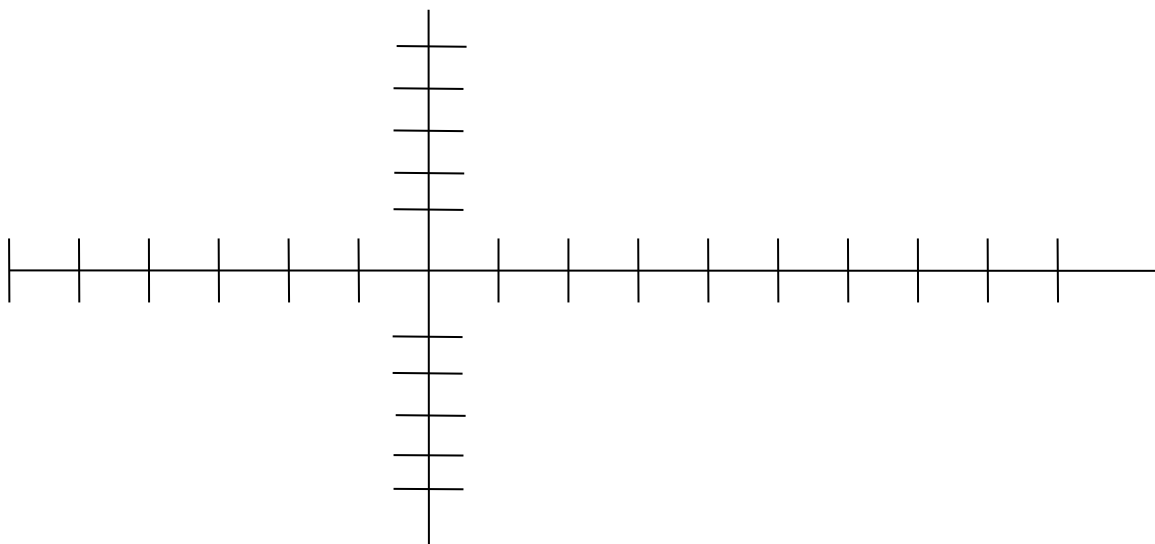
   b. Period   b._____

   c. Graph one positive and one negative period. (be sure to label graph)

3. Given, $y = 3\cos\left(\theta - \dfrac{\pi}{2}\right)$ find the following:

    a. Amplitude

                                                                                3 a._____

    b. Period

                                                                                b._____

    c. Phase Shift

                                                                                 c._____

    d. Graph one positive and one negative period. (be sure to label graph)

4. Given, $y = -2\sin\theta - 1$ find the following in radians:

    a. Amplitude

                                                                                4 a._____

    b. Period

                                                                                  b._____
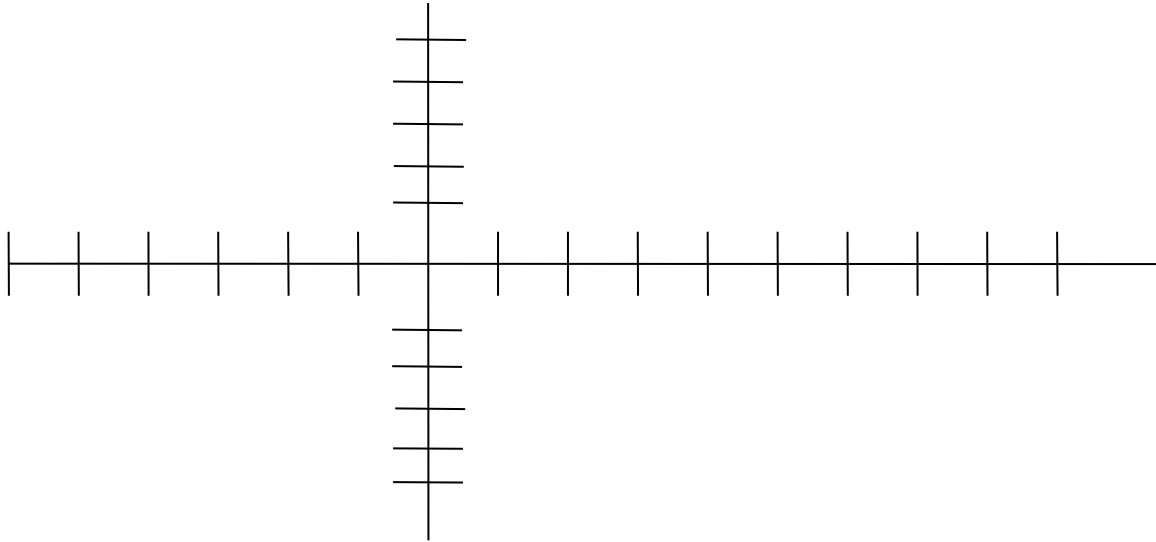
    c. Vertical Shift
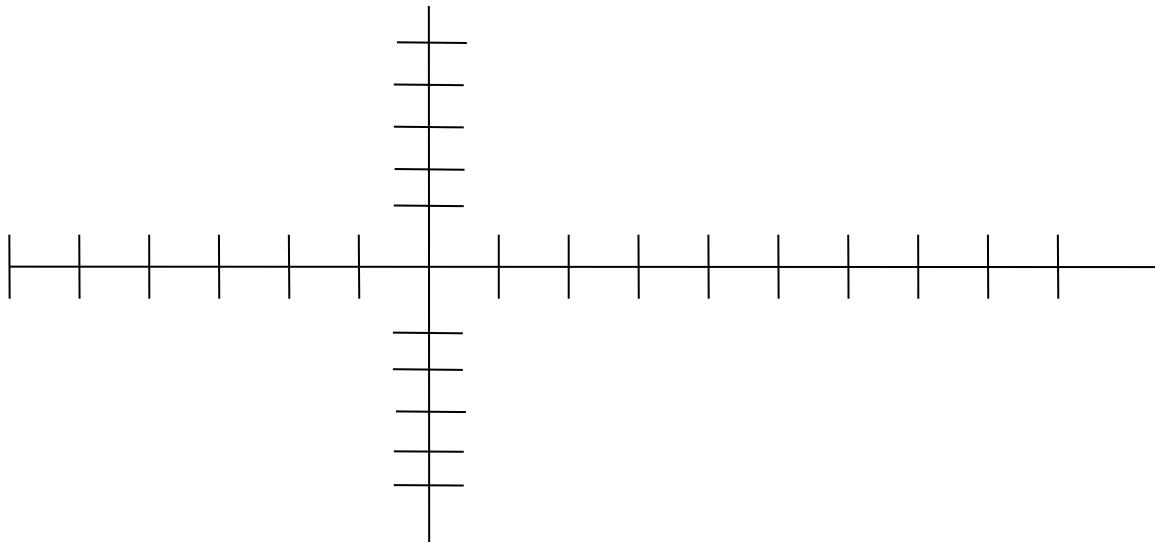
                                                                              c._____

    d. Graph one positive and one negative period. (be sure to label graph)

<u>**CHAPTER 8 – RATIONAL EXPRESSIONS**</u> **Due Wednesday 6/6/18**

Simplify each expression.

1. $\dfrac{21x^3 y}{14x^2 y^2}$

2. $\dfrac{x^2 + x - 6}{x^2 - 6x - 27}$

1._____

2._____

3. $\dfrac{(m-3)^2}{m^2 - 6m + 9} \bullet \dfrac{m^3 - 9m}{m^2 - 9}$

4. $\dfrac{c^2 - 3c}{c^2 - 25} \bullet \dfrac{c^2 + 4c - 5}{c^2 - 4c + 3}$

3._____

4._____

5. $\dfrac{6xy^4}{25z^3} \div \dfrac{18xz^2}{5y}$

6. $\dfrac{16p^2 - 8p + 1}{14p^4} \div \dfrac{4p^2 + 7p - 2}{7p^5}$

5._____

6._____

7. $\dfrac{3}{8p^2 q} + \dfrac{5}{4p^2 q}$

8. $\dfrac{4z}{z-4} + \dfrac{z+4}{z+1}$

7._____

8._____

9. $\dfrac{3}{w-3} - \dfrac{18}{w^2 - 9}$

10. $\dfrac{5}{3b+d} - \dfrac{2}{3bd}$

9._____

10._____

Determine any value(s) of x that are undefined.

11. $f(x) = \dfrac{3x - 1}{3x^2 + 5x - 2}$

12. $f(x) = \dfrac{x^2 - x - 12}{x^2 - 4x}$

11._____

12._____

Solve the following.

13. $\dfrac{3}{x+1} = \dfrac{9}{4x+5}$

14. $\dfrac{3}{2} + \dfrac{4}{x-1} = \dfrac{x+1}{x-1}$

13._____

14._____

15. $1 - \dfrac{8}{x-5} = \dfrac{3}{x}$

16. $\dfrac{6}{x-3} = \dfrac{8x^2}{x^2-9} - \dfrac{4x}{x+3}$

15._____

16._____

17. $\dfrac{x+1}{x+6} + \dfrac{1}{x} = \dfrac{2x+1}{x+6}$

18. $\dfrac{2}{x-3} + \dfrac{1}{x} = \dfrac{x-1}{x-3}$

17._____

18._____

19. Find the product: $\dfrac{x^2-11x+24}{x^2-18x+80} \cdot \dfrac{x^2-15x+50}{x^2-9x+20}$

19._____

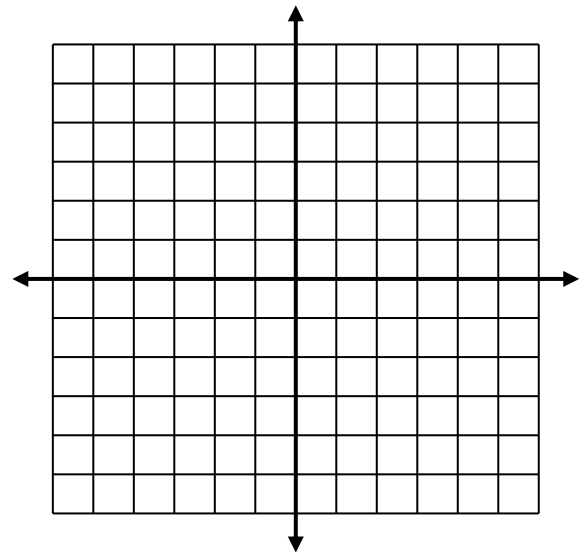20. Solve: $\dfrac{2}{x-1} = 4 - \dfrac{x}{x-1}$

20._____

21. Solve: $\dfrac{9}{x-3} = \dfrac{x-4}{x-3} + \dfrac{1}{4}$

21._____

Graph the following – be sure to include the vertical and horizontal asymptotes.

22. $y = \dfrac{2}{x-1} - 3$

x	y

Vertical Asymptote: _____

Horizontal Asymptote: _____

Domain: _____

Range: _____

x-int : _____

y-int : _____

23. $y = \dfrac{6x-1}{3x+6}$

x	y

Vertical Asymptote: _____

Horizontal Asymptote: _____

Domain: _____

Range: _____

x-int : _____

y-int : _____

24. $y = \dfrac{x}{x^2 - 4}$

x	y

Vertical Asymptote: _____

Horizontal Asymptote: _____
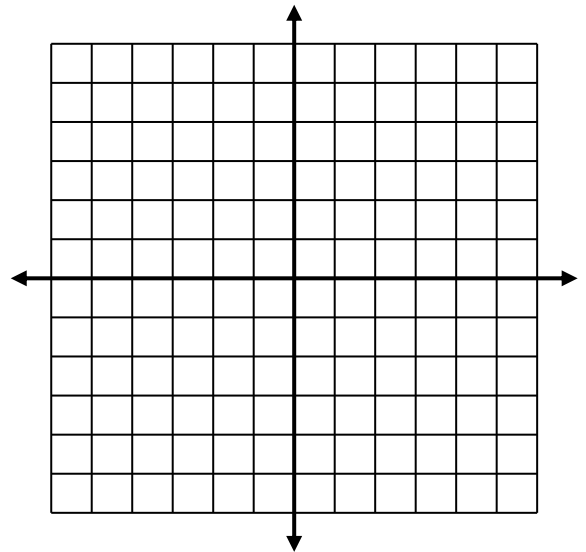
Domain: _____

Range: _____

x-int : _____

y-int : _____

25. $y = \dfrac{x^2 - 2x + 1}{x + 2}$

Vertical Asymptote: _____
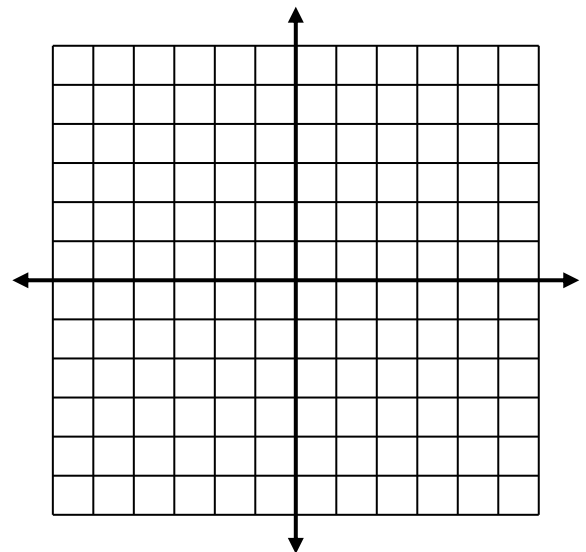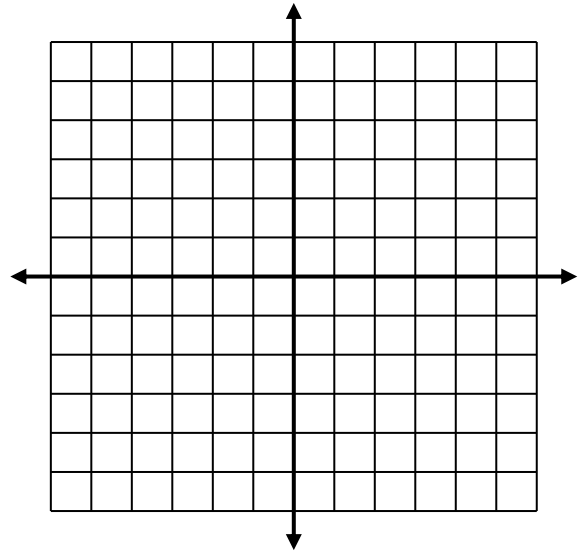
Horizontal Asymptote: _____

Domain: _____

Range: _____

x-int : _____

y-int : _____

x	y

1. A briefcase lock has 3 rotating cylinders each containing 10 digits.   1._____
   How many numerical codes are possible?

2. Allan is playing the role of Oliver in his school's production of *Oliver Twist.*   2._____
   The wardrobe crew has presented Allan with 5 pairs of pants and 4 shirts
   that he can wear. How many possible costumes consisting of a pair of pants
   and a shirt does Allan have to choose from?

3. A Mexican restaurant offers chicken, beef, or vegetarian fajitas wrapped   3._____
   with either corn or flour tortillas, and topped with either mild, medium or
   hot salsa. How many different choices of fajitas does a customer have?

4. How many 7-digit phone numbers can be formed if the first digit cannot   4._____
   be 0 or 1, and no digit can be repeated?

Determine whether each situation involves a permutation of combination. Then find the number of possibilities.

5. Seating 8 students in 8 seats in the front row of the school auditorium.   5._____

6. Checking out 3 library books from a list of 8 books for a research paper.   6._____

7. Electing 4 candidates to a municipal planning board from a field of 7 candidates.   7._____

8. The first, second and third place finishers in a race with 10 contestants.   8._____

Evaluate.

9. $_5P_3$ 10. $_6C_2$ 11. $6!$ 12. $\dfrac{10!}{5!\,5!}$ 9._____

    10._____

    11._____

    12._____

13. Find the number of distinguishable permutations in the following word:

   a. PANAMA   b. FACTORIAL   c. MISSISSIPPI   13 a._____

    b._____

    c._____

14. Find the number of possible 5-card hands that contain the cards specified. The cards are taken from a standard 52-card deck.

a. 4 kings and one other card

14 a._____

b. 5 hearts or 5 diamonds

b._____

15. Six representatives from a senior class of 350 students are to be chosen for the student council. In how many ways can these students be chosen to represent the senior class on the student council?

15._____

16. You have an equally likely chance of choosing any integer from 1 through 30. Find the probability of the given event.

a. An even number is chosen   b. A multiple of 5 is chosen   16 a._____

b._____

c. A factor of 60 is chosen   d. A prime number is chosen   c._____

d._____

17. Let A and B be events such that $P(A) = \dfrac{2}{3}$, $P(B) = \dfrac{1}{2}$ and $P(A\,and\,B) = \dfrac{1}{3}$. Find $P(A\,or\,B)$.

17._____

18. Let A and B be events such that P(A) = 0.32, P(B) = 0.48, and P(A and B) = 0.12. Find the indicated probability.

$P(A$ or $B)$

18 ._____

19. A card is randomly selected from a standard deck of 52 cards. Find the probability of drawing the given card.

a. A red king   b. A diamond or a 3   c. Not a club   19 a._____

b._____

c._____

20. Two six-sided dice are rolled. Find the probability of the given event.

a. The sum is not 7   b. The sum is less than 8 or greater than 11   20 a._____

b._____

Find the odds in favor of an event, given the probability of the event.

21. $\dfrac{3}{7}$ 22. $\dfrac{4}{5}$ 23. $\dfrac{1}{15}$

21._____

22._____

23._____

Find the probability of an event occurring, given the odds of the event.

24. 10:1   25. 4:9   26. 8:3

24._____

25._____

26._____

27. A die is rolled twice. Find the probability.
   a. $P(5, \text{then } 6)$

27 a._____

   b. $P(4, \text{then not } 6)$

b._____

28. There are 3 nickels, 3 dimes and 5 quarters in a purse. Three coins are selected in succession at random. Find the probability.
   a. $P(\text{nickel, then dime, then quarter})$ if no replacement occurs.

28 a._____

   b. $P(3 \text{ dimes})$ if replacement occurs.

b._____

   c. $P(\text{ nickel, then 2 quarters})$ if replacement occurs.

c._____

   d. $P(3 \text{ quarters})$ if no replacement occurs.

d._____

29. Serena is creating a painting. She wants to use 2 more colors. She chooses randomly from 6 shades of red, 10 shades of green, 4 shades of yellow, 4 shades of purple and 6 shades of blue. What is the probability that she chooses 2 shades of green?

29._____

30. Becky's mother is shopping at the bakery. The owner offers Becky a cookie from a jar containing 22 chocolate chip cookies, 18 sugar cookies and 15 oatmeal cookies. Without looking, Becky selects one, drops it back in, and then randomly selects another. What is the probability that neither selection was a chocolate chip cookie?

30._____

31. A die is rolled. Find each probability.
   a. $P(5 \text{ or } 6)$ b. $P(\text{at least a } 3)$

31 a._____

b._____