Algebra 2 Trig G
Review For Semester 2

Name Key

Chapter 8 – RATIONAL EXPRESSIONS

Simplify the fraction or rational expression:

1) $\frac{54}{108}$ $\frac{1}{2}$

2) $\frac{x^2-7x-30}{x^2-5x-24}$ $(x-10)(x+3)$ / $(x-8)(x+3)$ $\frac{x-10}{x-8}$

3) $\frac{6(x^2-x-12)}{33(x^2+10x+21)}$ $2(x-4)(x+3)$ / $11(x+7)(x+3)$ $= \frac{2(x-4)}{11(x+7)}$

4) $\frac{5x^8z^2}{6xy^3} \bullet \frac{12y^4z}{5x^2y^2z^4}$ x^2, 2 / $1\ y$, z $\frac{2x^2}{yz}$

5) $\frac{1}{x-4} \bullet \frac{x^2-7x+12}{x+3}$ $(x-3)(x-4)$ $= \frac{x-3}{x+3}$

6) $\frac{x+1}{x^2+7x+10} \div \frac{x-3}{x^2+2x-15}$ $(x+5)(x-3)$ / $(x+5)(x+2)$, $x-3$ $\frac{x+1}{x+2}$

7) $\frac{2b^2-12b}{b+5} \div \frac{b-6}{b+5}$ $2b(b-6)$, $b+5$ / $b-6$ $2b$

8) $\frac{4x}{18x^3y} + \frac{5}{9x^2y^3}$ (y^2), $(2x)$ / (y^2) $= \frac{4xy^2+10x}{18x^3y^3} = \frac{2y^2+5}{9x^2y^3}$

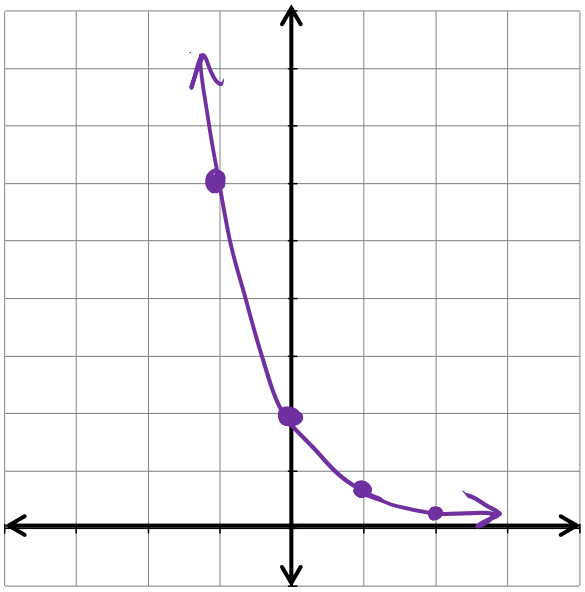
9) $\frac{3}{x^2+4x-12} + \frac{7}{x-2}$ $(x+6)$, $(x+6)$ / $(x-2)(x+6)$ $\frac{3+7x+42}{(x-2)(x+6)} = \frac{7x+45}{(x-2)(x+6)}$

10) $\frac{3}{y+5} - \frac{y}{y^2+7y+10}$ $(y+2)$, $(y+2)$ / $(y+5)(y+2)$ $\frac{3y+6-y}{(y+5)(y+2)}$ $\frac{2y+6}{(y+5)(y+2)} = \frac{2(y+3)}{(y+5)(y+2)}$

Chapter 9 - LOGARITHMS

Simplify.

11) Sketch a graph of the function. State its Domain and Range.



$y = 2\left(\frac{1}{3}\right)^x$

x	y
-1	6
0	2
1	2/3
2	2/9
3	2/27

Domain: $\mathbb{R}$

Range: $y > 0$

Growth OR Decay?

12) Write the exponential function that passes through $(0,4)$ and $(2,16)$ *use your calculator*

Stat - Edit

L1	L2
0	4
2	16

Stat - Calc 0: ExpReg

$y = 4(2)^x$

Solve each equation.

13) $3^x = 27$

$x = 3$

14) $2^{3y} = 16^{y-1}$

$2^{3y} = 2^{4(y-1)}$

$3y = 4y - 4$

$-1y = -4$

$y = 4$

Write each equation in **logarithmic form**.

15) $4^x = 32$

$\log_4 32 = x$

16) $x^2 = 36$

$\log_x 36 = 2$

Write each equation in **exponential form**.

17) $\log_{10} 100 = 2$

$10^2 = 1000$

18) $\log_3 27 = 3$

$3^3 = 27$

Solve each equation.

19) $\log_4 \frac{1}{64} = x$

$4^x = 4^{-3}$

$x = -3$

$4^x = \frac{1}{64}$

20) $\log_3 \frac{1}{9} = x$

$3^x = 3^{-2}$

$x = -2$

$3^x = \frac{1}{9}$

21) $\log_x 10 = \frac{1}{4}$

$x = 10{,}000$

$\left(x^{\frac{1}{4}}\right)^4 = (10)^4$

22) $\log_x 1 = 4$

$x = 1$

$x^4 = 1$

23) $\log_5 x - 2\log_5 3 = \log_5 5$

$\log_5 \frac{x}{3^2} = \log_5 5$

$\frac{x}{9} = 5$

$x = 45$

24) $\log_5 x + \log_5 3 = \log_5 15$

$\log_5 3x = \log_5 15$

$3x = 15$

$x = 5$

25) $\log_4 (4x-6) = \log_4 (2x-1)$

$4x - 6 = 2x - 1$

$2x = 5$

$x = 5/2$

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

$4x - 6 = x + 2$

$3x = 8$

$x = 8/3$

27) $\log_3 x - \log_3 3 = \log_3 30$

$\log_3 \frac{x}{3} = \log_3 30$

$\frac{x}{3} = 30$

$x = 90$

28) $\log_5 x + 2\log_5 3 = \log_5 5$

$\log_5 x \cdot 3^2 = \log_5 5$

$9x = 5$

$x = 5/9$

Use $\boxed{\log_2 3 = a}$ and $\boxed{\log_2 5 = b}$ to evaluate the expression.

29) $\log_2 50$

$\log_2 5 \cdot 5 \cdot 2$

$\log_2 5 + \log_2 5 + \log_2 2$

$b + b + 1$

$2b + 1$

30) $\log_2 \frac{18}{5}$

$\log_2 3^2 \cdot 2 \div 5$

$\log_2 3^2 + \log_2 2 - \log_2 5$

$2a + 1 - b$

31) $\log_2 30$

$\log_2 5 \cdot 3 \cdot 2$

$\log_2 5 + \log_2 3 + \log_2 2$

$b + a + 1$

32) $\log_2 \frac{25}{2}$

$\log_2 5^2 \div 2$

$\log_2 5^2 - \log_2 2$

$2b - 1$

Change each log expression to common logs. (round answers to four decimal places)

33) $\log_5 3$ $\frac{\log 3}{\log 5} = .6826$

34) $\log_3 10$ $\frac{\log 10}{\log 3} = 2.0959$

35) $\log_5 \frac{25}{4}$ $\frac{\log 25/4}{\log 5} = 1.1386$

36) $\log_{\frac{1}{4}} 9$ $\frac{\log 9}{\log 1/4} = -1.5850$

Solve each equation below. (round final answers to four decimal places)

37) $5^x = 19$

$\log 5^x = \log 19$

$x \cdot \log 5 = \log 19$

$x = 1.8295$

38) $12^{2x-1} = 23$

$(2x-1)\cdot \log 12 = \log 23$

$2x - 1 = 1.2618$

$2x = 2.2618$

$x = 1.1309$

39) $3^{x^2} = 7$

$x^2 \cdot \log 3 = \log 7$

$x^2 = 1.7712$

$x = 1.3309$

Use the equation: $\boxed{A = P\left(1 + \frac{r}{k}\right)^{kt}}$ **to answer #40 and 41 (round final answers to four decimal places)**

40) Tessa is saving for a new TV and stereo system. She just received $2000 for graduation and plans to invest it in an account that earns 4.35% interest compounded monthly. How long will she need to invest her money in order to have the $3000 she needs to buy the system?

$3000 = 2000\left(1 + \frac{.0435}{12}\right)^{12t}$

$1.5 = (1.0036)^{12t}$

$\log 1.5 = 12t \cdot \log 1.0036$

$112.8318 = 12t$

$9.4027 = t$ years

41) Phil wants to double his $17000 investment in 8 years. What interest rate would he need if the interest is compounded 6 times per year?

$34000 = 17000\left(1 + \frac{r}{6}\right)^{6\cdot 8}$

$\left(2\right)^{\frac{1}{48}} = \left(\left(1 + \frac{r}{6}\right)^{48}\right)^{1/48}$

$1.0145 = 1 + \frac{r}{6}$

$.0145 = \frac{r}{6}$

$.087 = r$

8.7%

Use the equation $\boxed{y = ab^x}$ **to solve #42 and 43. (round final answers to four decimal places)**

42) The population of Hinsdale was 2,800 people in the year 1910. By 1950, the population had increased to 12,500 people.

a) What was the rate of growth (b) per year for Hinsdale during that time?

$12500 = 2800(b)^{40}$

$(4.4643)^{\frac{1}{40}} = (b^{40})^{\frac{1}{40}}$

$b = 1.0381$

b) If that growth rate continues, what will the population be in the year 2015? $x = 105$

$y = 2800(1.0381)^{105}$

$y =$ **141,995 people**

c) When will the population reach 1 million people?

$1000000 = 2800(1.0381)^x$

$357.1429 = (1.0381)^x$

$\log 357.1429 = x \cdot \log 1.0381$

$157.2025 = x$ years

$1910 + 157 =$ **2067**

Chapter 13 - TRIG

43) Change $-75°$ to radians

$-75 \cdot \frac{\pi}{180} =$ $\boxed{-\frac{5\pi}{12}}$

44) Change $-315°$ to radians

$\boxed{-\frac{7\pi}{4}}$

45) Change $\frac{5}{3}\pi$ radians to degrees

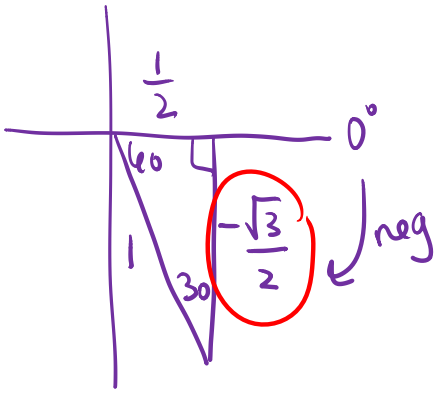
$\frac{5\pi}{3} \cdot \frac{180}{\pi} = \frac{900}{3} =$ $\boxed{300°}$

46) Change $\frac{5}{4}\pi$ radians to degrees

$\frac{5\pi}{4} \cdot \frac{180}{\pi} = \frac{900}{4} =$ $\boxed{225°}$

47) Find the exact value of $Sin\left(-\frac{\pi}{3}\right)$

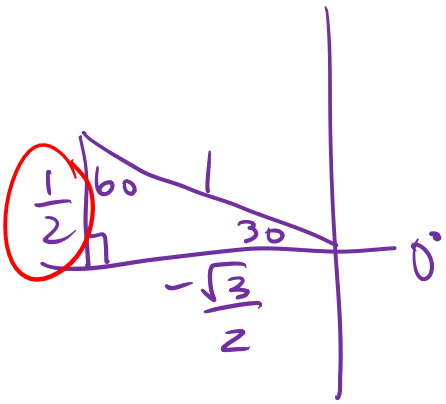
$\sin(-60°)$



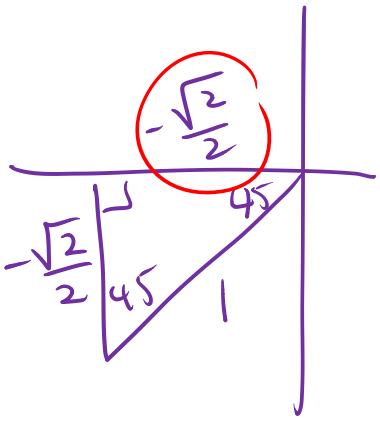
$\boxed{-\frac{\sqrt{3}}{2}}$

48) Find the exact value of $Sin(510)$

$\boxed{\frac{1}{2}}$



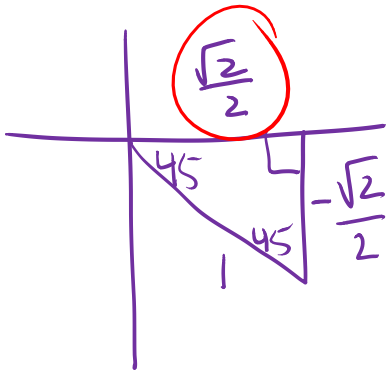
49) Find the exact value of $Cos(225°)$



$-\frac{\sqrt{2}}{2}$

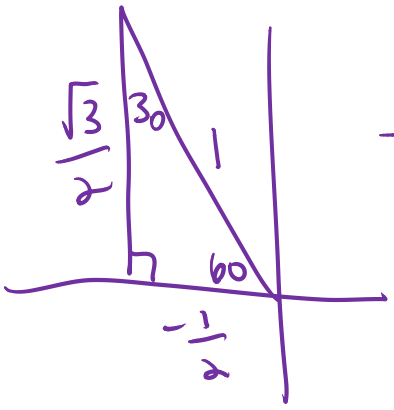
50) Find the exact value of $Cos\left(-\frac{\pi}{4}\right)$

Cos $-45°$



$\frac{\sqrt{2}}{2}$

51) Find the exact value of $Tan\left(\frac{2}{3}\pi\right)$



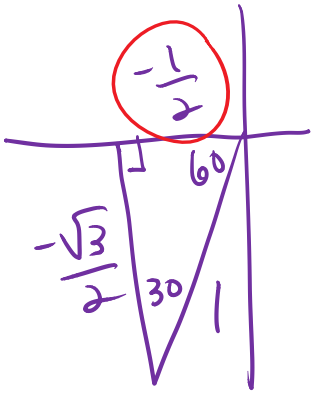
tan 120

$\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = -\frac{\sqrt{3}}{1} = -\sqrt{3}$

52) Find the exact value of $Sec(240°)$

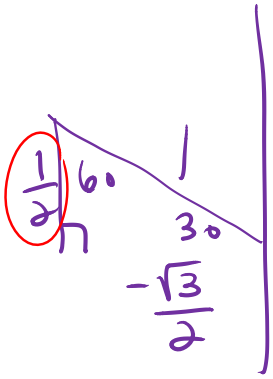
Cos 240 $= -\frac{1}{2}$

$\frac{-2}{1} = -2$



53) Find the exact value of $Csc(150°)$

sin 150 $= \frac{1}{2}$



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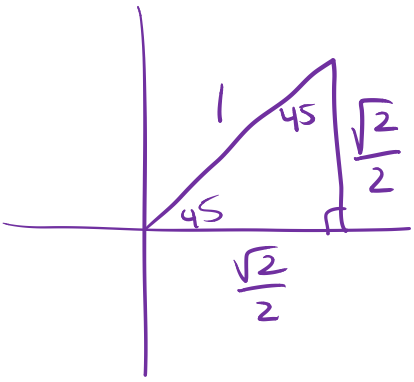
54) Find the exact value of $Cot\left(\frac{9\pi}{4}\right)$

tan 405 = 1



1

55) Find $Cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ in degrees.

* use calc

150°

56) Find $Sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ in degrees.

* use calc

-45°

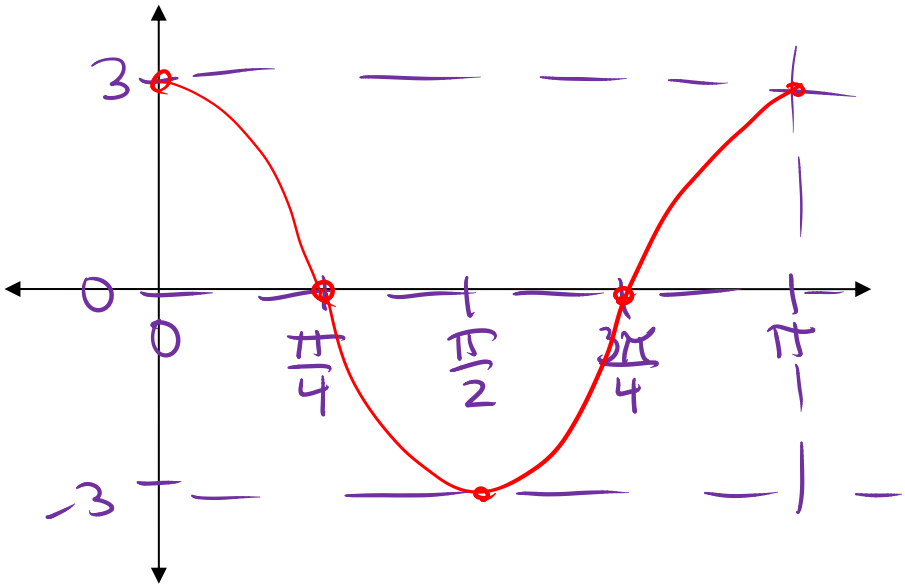
Chapter 14 – GRAPHING TRIG FUNCTIONS

57) Graph the function.

$y = 3 \cdot \cos(2x)$ Amplitude: 3 Period: $2\pi \cdot \frac{1}{2}$ (π) Critical Values: every $\frac{\pi}{4}$

Vertical Shift: 0 Max: 3 ($0+3$) Min: -3 ($0-3$) Horizontal Shift: 0

$0 \rightarrow \pi$



58) Graph the function.

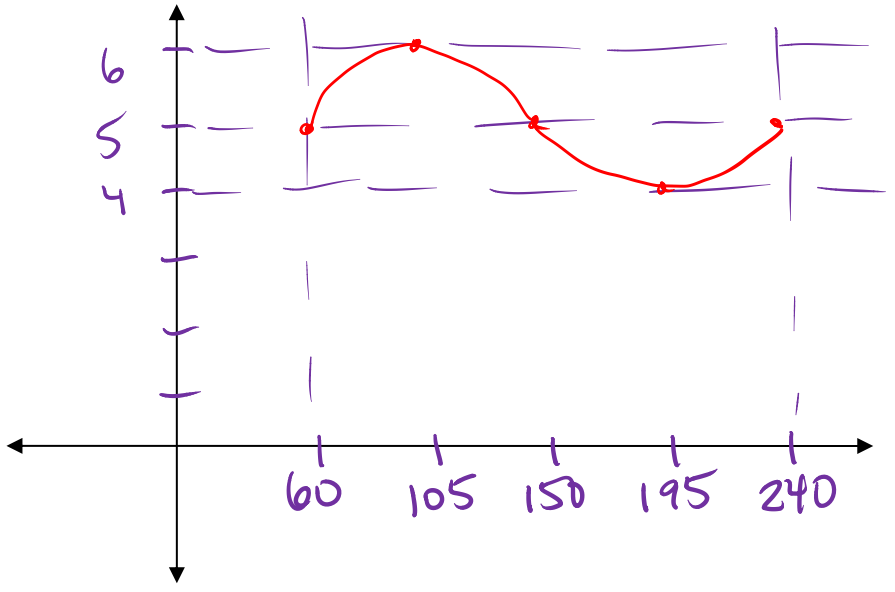
$y = \sin\left(2\left(\theta - 60^\circ\right)\right) + 5$ Amplitude: 1 Period: $360 \cdot \frac{1}{2}$ (180) Critical Values: $\frac{180}{4}$ every 45°

Vertical Shift: 5 Max: 6 ($5+1$) Min: 4 ($5-1$) Horizontal Shift: $+60$

$0 \rightarrow 180$

$+60 \quad +60$

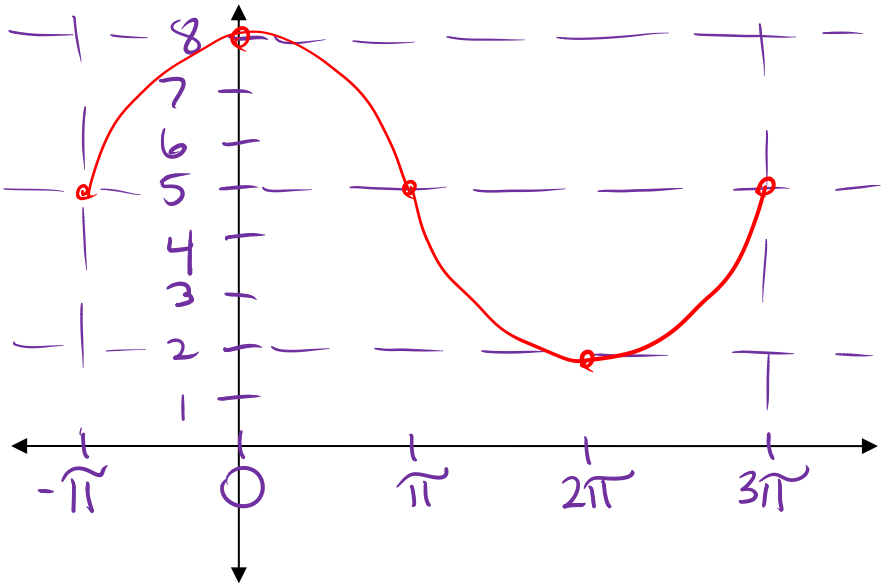
$60 \rightarrow 240$



59) Graph the function.

$y = 3 \cdot \sin\left(\frac{1}{2}(x+\pi)\right)+5$ Amplitude: 3 Period: $2\pi \cdot 2 = 4\pi$ Critical Values: $\frac{4\pi}{4}$ every π

Vertical Shift: 5 Max: 8 ($5+3$) Min: 2 ($5-3$) Horizontal Shift: $-\pi$



$0 \to 4\pi$

$-\pi \quad -\pi$

$-\pi \to 3\pi$

Chapter 12 - PROBABILITY

Answer the following questions about counting and probability.

60) How many ways can you form an outfit of shoes, pants, and a shirt if there are 10 pairs of shoes to choose from, 5 pairs of pants, and 5 shirts?

$10 \cdot 5 \cdot 5 = 250$

61) How many ways can you arrange 8 books on a shelf?

$8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 40{,}320$

62) A die is rolled twice. What is the probability of:

a) Getting an odd and then an even $\frac{3}{6} \cdot \frac{3}{6} = \frac{9}{36} = \frac{1}{4}$

b) Getting a 5 both times $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$

c) Getting a number less than 3 both times $\frac{2}{6} \cdot \frac{2}{6} = \frac{4}{36} = \frac{1}{9}$

63) A coin is tossed 3 times. Find the probability of getting 2 tails and 1 heads, in any order (make a tree diagram☺)

HHH
HHT
HTH
HTT ←
THH
THT ←
TTH ←
TTT

$\frac{3}{8}$

64) In my wallet there are 4 ten dollar bills and 6 five dollar bills. If three bills are drawn at random with no replacement, find the probability of the following:

a) P(2 tens and then a five)

$\frac{4}{10} \cdot \frac{3}{9} \cdot \frac{6}{8} = \frac{72}{720} = \frac{1}{10}$

b) P(3 fives)

$\frac{6}{10} \cdot \frac{5}{9} \cdot \frac{4}{8} = \frac{120}{720} = \frac{1}{6}$

65) How many different 7-digit phone numbers can be formed if the first three digits can be any number and the last four digits cannot be 0 or 1?

$10 \cdot 10 \cdot 10 \cdot 8 \cdot 8 \cdot 8 \cdot 8 = 4{,}096{,}000$

66) How many 8-character passwords can be formed if the first 4 characters are non-repeating letters and the last 4 characters are numbers?

$26 \cdot 25 \cdot 24 \cdot 23 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 3{,}588{,}000{,}000$

67) What is the probability of drawing, without replacement, 2 clubs, and then a diamond from a standard deck of cards?

$\frac{13}{52} \cdot \frac{12}{51} \cdot \frac{13}{50} = \frac{2028}{132600} = \frac{13}{850}$

68) What is the probability of drawing, without replacement, an Ace, then a 7, and then another Ace from a standard deck of cards?

$\frac{4}{52} \cdot \frac{4}{51} \cdot \frac{3}{50} = \frac{48}{132600} = \frac{2}{5525}$

69) Bobby has a standard deck of playing cards. He picks one card out of the deck. What is the probability that it is a 9 or a black card?

$\frac{4}{52} + \frac{26}{52} - \frac{2}{52} = \frac{28}{52} = \frac{7}{13}$

70) Frank has a standard deck of playing cards. He picks one card out of the deck. What is the probability that it is a King or a spade?

$\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$

STATISTICS

71) The data set below gives the numbers of touchdowns for the 8 quarterbacks who threw the most touchdowns during a regular NFL season. Find the standard deviation.

55, 50, 49, 48, 46, 45, 44, 43 $\mu = 47.5$

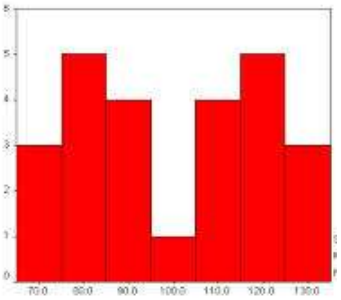
7.5 2.5 1.5 .5 1.5 2.5 3.5 4.5

$\frac{56.25 + 6.25 + 7.25 + .25 + 2.25 + 6.25 + 12.25 + 20.25}{106}$

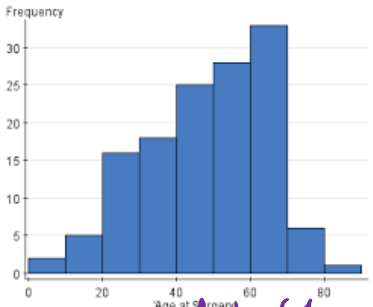
$\frac{106}{8} = 13.25$

$\sqrt{13.25} = 3.64$

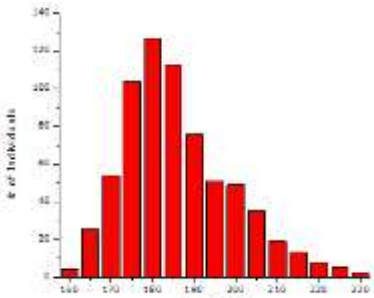
72) Describe the distribution based on the shape of the histogram. You may choose more than one term. (Uniform, Symmetric, Skewed Left, Skewed Right, No Mode, Unimodal, Bimodal, Multimodal)

a. 

Symmetric
Bimodal

b. 

Skewed Left
Unimodal

c. 

Skewed Right
Unimodal

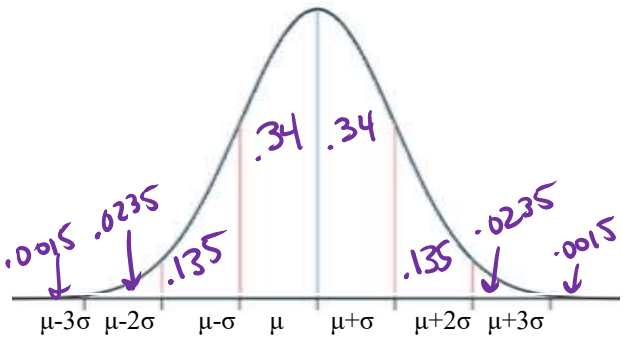
73) Find the following probabilities based on the normal distribution.

a. $P(x < \mu + 2\sigma)$ .975

b. $P(\mu - 3\sigma < x < \mu + 3\sigma)$ .997

c. $P(x > \mu - \sigma)$ .84

d. $P(\mu - 2\sigma < x < \mu + \sigma)$ .815



74) Hourly wage at a company is *normally distributed*. The mean hourly wage is $10.75 and the standard deviation is $2.25.

a) What percent of people have an hourly wage that is less than $7.85?

$z = \frac{7.85 - 10.75}{2.25} = -1.29 \rightarrow .0985$

b) What percent of people have an hourly wage that is greater than $15.35?

$z = \frac{15.35 - 10.75}{2.25} = 2.04 \rightarrow .9793$

subtract from 1

$1 - .9793 = .0207$

ARITHMETIC AND GEOMETRIC SEQUENCES

75) Is the sequence arithmetic or geometric?

a) 2, 6, 18, 54, 162, … (×3)

geometric

b) -8, -3, 2, 7, 12, … (+5)

arithmetic

76) An arithmetic sequence begins with the terms 5, 27, 49, 71, … One of the terms in the sequence is 1391. Find the term number.

$a_n = a_1 + d(n-1)$

$1391 = 5 + 22(n-1)$

$1386 = 22(n-1)$

$63 = n-1$

$n = 64^{th}$

77) An arithmetic sequence begins with the term -6 and the 18th term is -193. Find the common difference (d).

$-193 = -6 + d(18-1)$

$-187 = 17 \cdot d$

$-11 = d$

78) A geometric sequence begins with the terms 1000, 500, 250, 125, … Find the 8th term.

$a_n = a_1 \cdot r^{n-1}$

$a_8 = 1000 \cdot \frac{1}{2}^{8-1}$

$a_8 = 7.8125$

79) A geometric sequence begins with the term 2 and the 13th term is 8192. Find the common ratio (r).

$8192 = 2 \cdot r^{13-1}$

$(4096)^{1/12} = (r^{12})^{1/12}$

$2 = r$