Algebra II: Ms. Linzmeier
Semester 2 Review Packet

Name: Answer Key

Chapter 5

1. Simplify.

a. $\frac{6x^3}{y^2} \div \frac{3xy}{2}$

$\frac{\overset{2}{\cancel{6}}x^{\cancel{3}}}{y^2} \cdot \frac{2}{\cancel{3}\cancel{x}y} = \boxed{\frac{4x^2}{y^3}}$

b. $\frac{x^2}{x^2-1} \div \frac{4x^2}{x^2-2x+1}$

$(x-1)(x+1) \quad (x-1)(x-1)$

$= \frac{\cancel{x^2}}{\cancel{(x-1)}(x+1)} \cdot \frac{\cancel{(x-1)}(x-1)}{4\cancel{x^2}}$

$= \boxed{\frac{(x-1)}{4(x+1)}}$

c. $\frac{\cancel{t-2}}{\cancel{t+3}} \cdot \frac{t^2+2t-3}{t^2-t-2}$

$\frac{(\cancel{t+3})(t-1)}{(\cancel{t-2})(t+1)} = \boxed{\frac{(t-1)}{(t+1)}}$

2. Simplify. LCD: a^2b^2

a. $\frac{1}{a^2} \cdot \frac{b^2}{b^2} - \frac{2}{ab} \cdot \frac{(ab)}{(ab)} + \frac{1}{b^2} \cdot \frac{a^2}{a^2}$

$\frac{b^2 - 2ab + a^2}{a^2b^2}$

b. $\left(\frac{3m-2}{6}\right)\frac{3}{3} - \left(\frac{m-3}{9}\right)\frac{2}{2}$

$\frac{9m-6}{18} - \frac{(2m-6)}{18}$

$\frac{9m-6-2m+6}{18} = \boxed{\frac{7m}{18}}$

3. Solve.

a. $\left(\frac{4t}{3} + \frac{3t}{10} = \frac{7}{5}\right)\frac{30}{1}$

$4t(10) + 3t(3) = 7(6)$

$40t + 9t = 42$

$\frac{49t}{49} = \frac{42}{49}$

$\boxed{t = \frac{6}{7}}$

b. $\left(\frac{y+3}{2} + \frac{3}{5} \geq \frac{y+1}{10}\right)\frac{10}{1}$

$(y+3)5 + 3(2) \geq y + 1$

$5y + 15 + 6 \geq y + 1$

$-y \quad -21 \quad -y -21$

$\frac{4y}{4} \geq \frac{-20}{4}$

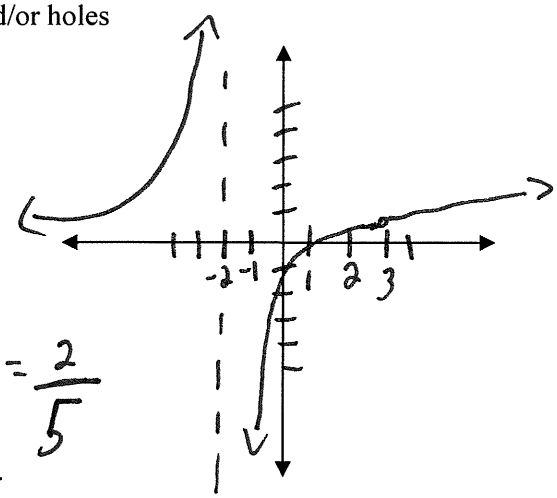
$\boxed{y \geq -5}$

4. For the rational function: a.) Identify the excluded values in the domain

b.) Identify the locations of all holes and vertical asymptotes

c.) Graph the function. Show all asymptotes and/or holes

$f(x) = \frac{x^2-4x+3}{(x-3)(x+2)} = \frac{\cancel{(x-3)}(x-1)}{\cancel{(x-3)}(x+2)}$



excluded values: $x-3=0$ $\quad x+2=0$

$x=3$ $\quad x=-2$

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

hole

Excluded Values are: $x \neq 3, -2$

Hole(s) are at: $(3, \frac{2}{5})$

$f(-2) = \frac{-2-1}{-2+2} = \frac{-3}{0}$

vert. asy

Vertical Asymptotes are at: $x=-2$

Chapter 6

1. Simplify each expression that has a real root. If the expression does not represent **a real number**, say so.

a. $-\sqrt{25}$ $\quad -5$

b. $\sqrt{-100}$ $\quad$ imaginary

c. $\sqrt[3]{-8}$ $\quad -2$

2. Simplify each radical.

a. $\sqrt{56}$

4 14

$2\sqrt{14}$

b. $\sqrt{\frac{20}{9}}$

$\frac{\sqrt{20}}{\sqrt{9}} = \boxed{\frac{2\sqrt{5}}{3}}$

c. $\sqrt[3]{128a^5b^6c} = 2^2ab^2\sqrt{2ac}$

64 2

8 8

222 222

2^7

$= \boxed{4ab^2\sqrt[3]{2a^2c}}$

d. $\frac{6}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\frac{6\sqrt{2}}{2} = \boxed{3\sqrt{2}}$

e. $\sqrt{\frac{270}{6}} =$

180

90 2

3 30 5·2

3

$6\sqrt{5}$

$\frac{\sqrt{270}}{\sqrt{6}} = \frac{3\sqrt{30}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$

$\frac{3\sqrt{180}}{6} = \frac{18\sqrt{5}}{6}$

$= \boxed{3\sqrt{5}}$

270

9 30

f. $\sqrt{\frac{3}{8}} = \frac{\sqrt{3}}{2\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{6}}{4}$

$\sqrt{12} = 2\sqrt{3}$

$\sqrt{48}$

$16 \; 3$

$4\sqrt{3}$

3. Simplify. If no simplification is possible, say so

a. $5\sqrt{3} - 4\sqrt{2}$

No

b. $3\sqrt{12} - \sqrt{48}$

$3 \cdot 2\sqrt{3} - 4\sqrt{3}$

$6\sqrt{3} - 4\sqrt{3}$

$2\sqrt{3}$

c. $\sqrt{18} + \sqrt{24} - \sqrt{54}$

$2 \; 9 \quad 4 \; 6 \quad 9 \; 6$

$3 \; 3 \quad 2 \; 2 \quad 3 \; 3$

$3\sqrt{2} + 2\sqrt{6} - 3\sqrt{6}$

$\boxed{3\sqrt{2} - \sqrt{6}}$

4. Simplify the following binomials.

a. $(5 + \sqrt{2})(3 - \sqrt{2})$

$15 - 5\sqrt{2} + 3\sqrt{2} - 2$

$\boxed{13 - 2\sqrt{2}}$

b. $\frac{5}{2-\sqrt{5}}\left(\frac{2+\sqrt{5}}{2+\sqrt{5}}\right) = \frac{10+5\sqrt{5}}{4-5} = \frac{10+5\sqrt{5}}{-1}$

$\boxed{-10 - 5\sqrt{5}}$

5. Circle the appropriate terms that correspond to each real number.

a. $\sqrt{7}$ Rational or Irrational AND Terminating Decimal or Repeating Decimal or Non-repeating Decimal

b. $\sqrt{\frac{16}{25}}$ Rational or Irrational AND Terminating Decimal or Repeating Decimal or Non-repeating Decimal

c. $\frac{640}{111}$ Rational or Irrational AND Terminating Decimal or Repeating Decimal or Non-repeating Decimal

6. Write the decimal as a common fraction **in lowest terms.**

4.72 $\quad 4\frac{72}{100} = \boxed{4\frac{18}{25}}$

7. Write the repeating decimal as a common fraction **in lowest terms.**

$2.\overline{36} = N$

$100N = 236.\overline{36}$

$-\; N \quad - \quad 2.\overline{36}$

$\frac{99N}{99} = \frac{234}{99}$

$\boxed{N = \frac{26}{11}}$

8. Use **long division** to write the following fraction into a decimal. **Show your work to receive full credit**.

a. $\frac{15}{16}$

$$
\begin{array}{r}
.9375 \\
16\overline{)15000} \\
-144 \\
\hline
60 \\
-48 \\
\hline
120 \\
-112 \\
\hline
80
\end{array}
$$

b. $\frac{41}{11}$

$$
\begin{array}{r}
3.7272 \\
11\overline{)41.000} \\
-33 \\
\hline
80 \\
-77 \\
\hline
30 \\
-22 \\
\hline
80 \\
-77 \\
\hline
3
\end{array}
$$

$3.\overline{72}$

9. Simplify the following square roots of **IMAGINARY NUMBERS.**

a. $\sqrt{-5} \cdot \sqrt{-10}$

$i\sqrt{5} \cdot i\sqrt{10}$

$i^2\sqrt{50}$

$25 \quad 2$

$\boxed{-5\sqrt{2}}$

b. $\sqrt{-25} + \sqrt{-36}$

$5i + 6i$

$11i$

c. $\frac{10}{\sqrt{-5}} = \frac{10}{i\sqrt{5}} \cdot \frac{i\sqrt{5}}{i\sqrt{5}} = \frac{10i\sqrt{5}}{-5} = \boxed{-2i\sqrt{5}}$

10. Simplify the following complex numbers. **Give answers in the form a+bi.**

a. $(4 + 5i) + (8 - 7i)$

$12 - 2i$

b. $(2 - 4i)^2$

$(2-4i)(2-4i)$

$4 - 8i - 8i + 16i^2$

$4 - 16i - 16$

$\boxed{-12 - 16i}$

c. $\frac{15}{2-i} \cdot \frac{(2+i)}{2+i} = \frac{30 + 15i}{4 - i^2}$

$\frac{\cancel{30} + \cancel{15}i}{\cancel{5}}$

$\boxed{6 + 3i}$

Chapter 7

Matching: (Not all options are used)

a. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

b. $ax^2 + bx + c = 0$

c. $b^2 - 4ac$

d. If D is positive and a perfect square, then

e. If D is positive and NOT a perfect square, then

f. If D is negative, then

g. If D = 0, then

h. $3 + 2i$

i. $3 - 2i$

f There are 2 imaginary solutions

e There are 2 real, irrational solutions

g There is one real, rational (double) solution

d There are 2 real, rational solutions

i The conjugate of $3 + 2i$

c Discriminant

b Standard Quadratic Equation

a Quadratic Formula

1. Use the quadratic formula to solve the following equations. **Give answers involving radicals in simplest radical form (aka: no decimals).**

a. $2x^2 - 3x - 2 = 0$

$\boxed{x = -\frac{1}{2}, 2}$

$a = 2 \quad b = -3 \quad c = -2$

$x = \frac{3 \pm \sqrt{(-3)^2 - 4(2)(-2)}}{2(2)}$

$= \frac{3 \pm \sqrt{25}}{4}$

$= \frac{3 \pm 5}{4}$ → $\frac{3+5}{4} = 2$, $\frac{3-5}{4} = -\frac{1}{2}$

b. $5x^2 + 8 = -12x$

$+12x \quad +12x$

$5x^2 + 12x + 8 = 0$

a b c

144 − 160

$x = \frac{-12 \pm \sqrt{12^2 - 4(5)(8)}}{2(5)}$

$= \frac{-12 \pm \sqrt{-16}}{10}$

$= \frac{-12 \pm 4i}{10} = \boxed{\frac{-6 \pm 2i}{5}}$

2. Complete the square to solve the following equations. **Give answers involving radicals in simplest radical form (aka: no decimals).**

a. $x^2 - 4x + 2 = 0$

$-2 \quad -2$

$\left(\frac{-4}{2}\right)^2$

$x^2 - 4x + 4 = -2 + 4$

$\sqrt{(x-2)^2} = \sqrt{2}$

$x - 2 = \pm\sqrt{2}$

$+2 \quad +2$

$\boxed{x = 2 \pm \sqrt{2}}$

b. $4x^2 - 8x - 3 = 0$

$+3 \quad +3$

$\left(\frac{-2}{2}\right)^2$

$4(x^2 - 2x + 1) = 3 + 4$

$\frac{4(x-1)^2}{4} = \frac{7}{4}$

$\sqrt{(x-1)^2} = \sqrt{\frac{7}{4}}$

$x - 1 = \pm\frac{\sqrt{7}}{2}$

$+1 \quad +1$

$\boxed{x = 1 \pm \frac{\sqrt{7}}{2}}$

3. Without solving each equation, use the discriminant to determine the nature of its roots.

a. $x^2 - 4x - 5 = 0$

$D = (-4)^2 - 4(1)(-5)$
$= 16 + 20$
$D = 36$

$\boxed{\text{2 real rational roots}}$

b. $2x^2 - 9x + 3 = 0$

$D = (-9)^2 - 4(2)(3)$
$= 81 - 24$
$D = 57$

$\boxed{\text{2 real irrational roots}}$

c. $2x^2 - 4x + 5 = 0$

$D = (-4)^2 - 4(2)(5)$
$= 16 - 40$
$D = -24$

2 imaginary roots

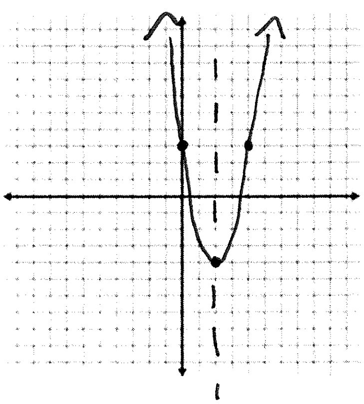
d. $x^2 - 4x + 4 = 0$

$D = (-4)^2 - 4(1)(4)$
$= 16 - 16$
$D = 0$

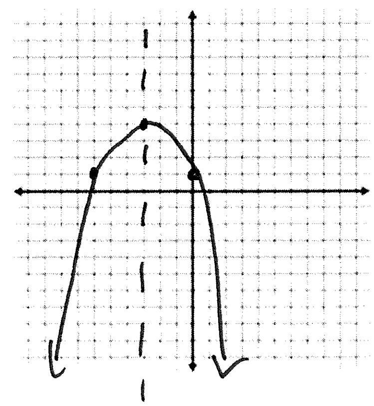
1 real, double root

4. Sketch the graph of the quadratic function with each given vertex and intercept.

a. $vertex = (2, -4)$
$y - int = 3$



b. $vertex = (-3, 4)$
$y - inter = 1$



5. Consider the quadratic function $y = 2x^2 + 20x + 53$

a. What is the y-intercept? $(0, 53)$

b. Transform the equation into vertex form.

$\left(\frac{10}{2}\right)^2$

$y - 53 = 2x^2 + 20x$
$y - 53 + \underline{50} = 2(x^2 + 10x + 25)$
$\boxed{y - 3 = 2(x+5)^2}$

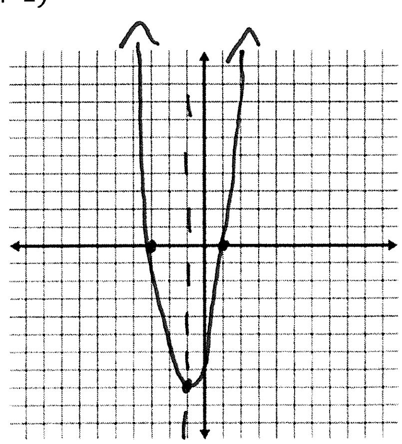
6. An equation was put into vertex form and the result was $y + 8 = 2(x + 1)^2$

a. State the **coordinates** of the vertex. $(-1, -8)$
b. State the **equation** of the axis of symmetry. $x = -1$
c. State the x-intercepts

$\frac{8}{2} = \frac{2(x+1)^2}{2}$
$\sqrt{4} = \sqrt{(x+1)^2}$
$\pm 2 = x + 1$

$x = -1 \pm 2$
$x = 1, -3$
$(1, 0), (-3, 0)$

d. Graph the equation



7. Find the equation for the parabola that contains the points, $(1, 6), (3, 26)$, and $(-2, 21)$. **Please show Matrix A and Matrix B.**

7) (1,6) (3,26) (-2,21)

(1,6): $a+b+c=6$

(3,26): $9a+3b+c=26$

(-2,21): $4a+-2b+c=21$

$$\begin{array}{cccc} A & B & & \\ \begin{bmatrix} 1 & 1 & 1 \\ 9 & 3 & 1 \\ 4 & -2 & 1 \end{bmatrix} & \begin{bmatrix} 6 \\ 26 \\ 21 \end{bmatrix} = & \begin{bmatrix} a \\ b \\ c \end{bmatrix} & \begin{bmatrix} 3 \\ -2 \\ 5 \end{bmatrix} \end{array}$$

$A^{-1}B = X$ $\boxed{y = 3x^2 - 2x + 5}$

Chapter 8

1. If y varies directly as x, and $y = 25$, when $x = 35$,

a. Find the k-value

$y = k \cdot x$

$\frac{25}{35} = \frac{35k}{35}$ $k = \frac{5}{7}$

b. Find x when $y = 40$

$\frac{7}{5}\left(\frac{40}{1}\right) = \left(\frac{5}{7}x\right)\frac{7}{5}$

$56 = x$

2. If p varies **inversely** with the square of q, and $p = 18$ when $q = 4$.

a. Find the k-value

$p = \frac{k}{q^2}$ $\frac{18}{1} = \frac{k}{4^2}$

$288 = k$

b. Find p when $q = 3$

$p = \frac{288}{3^2}$

$p = 32$

3. Divide using long division

a. $\frac{x^3+3x^2-18x-40}{x-4}$

$$\begin{array}{r} \boxed{x^2 + 7x + 10} \\ x-4 \overline{) x^3 + 3x^2 - 18x - 40} \\ -x^3 + 4x^2 \\ \hline 7x^2 - 18x \\ -7x^2 + 28x \\ \hline 10x - 40 \\ -10x + 40 \\ \hline 0 \end{array}$$

b. $\frac{3x^4+x^3-2x+7}{x^2-x+1}$

$$\begin{array}{r} \boxed{3x^2 + 4x + 1 + \frac{-5x+6}{x^2-x+1}} \\ x^2 - x + 1 \overline{) 3x^4 + x^3 + 0x^2 - 2x + 7} \\ -3x^4 + 3x^3 \mp 3x^2 \\ \hline 4x^3 - 3x^2 - 2x \\ -4x^3 + 4x^2 \mp 4x \\ \hline x^2 - 6x + 7 \\ -x^2 + x \mp 1 \\ \hline -5x + 6 \end{array}$$

4. Divide using synthetic division.

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

$$\begin{array}{r|rrrrr} -1 & 1 & 0 & 3 & -1 & -5 \\ & \downarrow & -1 & 1 & -4 & 5 \\ \hline & 1 & -1 & 4 & -5 & 0 \end{array}$$

$\boxed{x^3 - x^2 + 4x - 5}$

5. Use synthetic division to find $P(c)$ for the given polynomial $P(x)$ and the given number c.

$P(x) = x^3 - 5x^2 + 5x - 7; c = 4$

Is 4 a factor of $P(x)$?

is $(x-4)$?

No

$$\begin{array}{r|rrrr} 4 & 1 & -5 & 5 & -7 \\ & \downarrow & 4 & -4 & 4 \\ \hline & 1 & -1 & 1 & -3 \end{array} \quad \boxed{P(4) = -3}$$

6. Consider the polynomial $3x^3 - 5x^2 - 34x + 24$

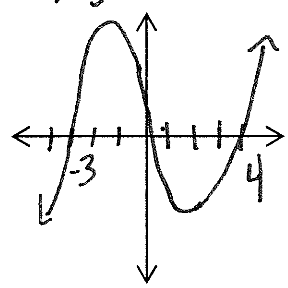
a. State the number of possible factors.

3

b. State all of the possible roots by using the rational root theorem.

$\frac{b}{a} \quad \frac{1,2,3,4,6,8,12,24}{1,3} \qquad \frac{b}{a} \in \pm\left\{1, \frac{1}{3}, 2, \frac{2}{3}, 3, 4, \frac{4}{3}, 6, 8, \frac{8}{3}, 12, 24\right\}$

c. Sketch a graph of the polynomial.



$x = -3, 4$

d. Using the calculator and/or synthetic division, find the roots of the polynomial and list its factors

$$\begin{array}{r|rrrr} -3 & 3 & -5 & -34 & 24 \\ & \downarrow & -9 & 42 & -24 \\ \hline & 3 & -14 & 8 & 0 \end{array} \qquad \begin{array}{r|rrr} 4 & 3 & -14 & 8 \\ & \downarrow & 12 & -8 \\ \hline & 3 & -2 & 0 \end{array}$$

$3x - 2 = 0$

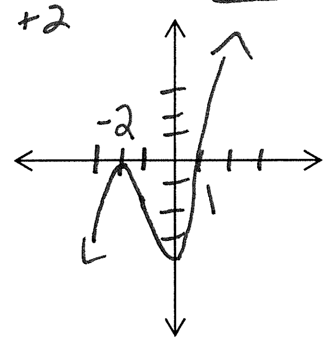
$+2 \quad +2$

$3x = 2$

$\boxed{x = -3, 4, \frac{2}{3} \quad (x+3)(x-4)(3x-2)}$

7. Consider the function $y = x^5 + 3x^4 + 9x^3 + 23x^2 - 36$

a. Sketch a graph of the function.



b. Find the values of all zeros of the function above.

$x = -2, -2, 1$

$$\begin{array}{l r|rrrrrr} x^5 & -2 & 1 & 3 & 9 & 23 & 0 & -36 \\ & & \downarrow & -2 & -2 & -14 & -18 & 36 \\ \hline x^4 & -2 & 1 & 1 & 7 & 9 & -18 & 0 \\ & & \downarrow & -2 & 2 & -18 & 18 & \\ \hline x^3 & 1 & 1 & -1 & 9 & -9 & 0 & \\ & & \downarrow & 1 & 0 & 9 & & \\ \hline x^2 & & 1 & 0 & 9 & 0 & & \end{array}$$

$x^2 + 9 = 0$

$-9 \quad -9$

$\sqrt{x^2} = \sqrt{-9}$

$x = \pm 3i$

$\boxed{x = -2, -2, 1, \pm 3i}$

Chapter 10

1. Rewrite in radical form.

a. $36^{1/2}$

$\sqrt{36}$

b. $49^{-1/2}$ $\frac{1}{49^{\frac{1}{2}}} = \frac{1}{\sqrt{49}}$

c. $64^{2/3}$ $(\sqrt[3]{64})^2$

2. Write in exponential form.

$\sqrt{x^3y^5}$ $x^{3/2}y^{5/2}$

3. Solve the equation.

$(a^{3/4})^{4/3} = (8)^{4/3}$

$a = (\sqrt[3]{8})^4$

$a = 2^4$

$\boxed{a = 16}$

4. Simplify.

a. $(3^{\sqrt{2}})^{\sqrt{2}}$

$3^2 = 9$

b. $(10^{\pi})^2$

$10^{2\pi}$

100^{π}

c. $(3^{\sqrt{2}})^2$

$3^{2\sqrt{2}}$

$= 9^{\sqrt{2}}$

d. $\frac{5^{\sqrt{2}+2}}{5^{\sqrt{2}-1}}$

$5^{\sqrt{2}+2-(\sqrt{2}-1)}$

$5^{2+1} = 5^3$

$= 125$

5. Solve for x.

$25^{3x} = 5^{4x+6}$

$5^{2(3x)} = 5^{4x+6}$

$6x = 4x + 6$

$-4x \quad -4x$

$\frac{2x}{2} = \frac{6}{2}$

$x = 3$

6. Write the equation in exponential form.

$log_3 81 = 4$

$3^4 = 81$

7. Write the equation in logarithmic form

$5^4 = 625$

$\log_5 625 = 4$

8. Simplify each logarithm.

a. $log_8 x = \frac{2}{3}$

$8^{2/3} = x$

$(\sqrt[3]{8})^2 = x$

$\boxed{4 = x}$

b. $\log_x 625 = 4$

$\sqrt[4]{x^4} = \sqrt[4]{625}$

$x = 5$

c. $\log_2 1024 = x$ or $\frac{\log 1024}{\log 2}$

$2^x = 1024$

$2^x = 2^{10}$

$\boxed{x = 10}$

$\log 9 = .95 \quad \log 2 = .30 \quad \log 10 = 1$

9. Express each logarithm in terms of ~~log2~~ M and

a) $\log 180 = \log(9 \cdot 2 \cdot 10)$

$= \log 9 + \log 2 + \log 10$

$= .95 + .30 + 1$

$= \boxed{2.25}$

b) $\log 5 = \log\left(\frac{10}{2}\right)$

$= \log 10 - \log 2$

$= 1 - .30$

$= \boxed{.70}$

c) $\log 81 = \log 9^2$

$= 2 \cdot \log 9$

$= 2(.95)$

$= \boxed{1.9}$

10. Express as a logarithm of a single number or expression.

a. $4\log_a 3$

$\log_a 3^4 = \boxed{\log_a 81}$

b. $\log_b 6 + \log_b 5 + \log_b 2$

$\log_b 30 + \log_b 2$

$\boxed{\log_b 60}$

c. $\log_b 3 + \log_b 8 - \log_b 4$

$\log_b 24 - \log_b 4$

$\boxed{\log_b 6}$

d. $\log_b 36 - \log_b 2 - \log_b 9$

$\log_b 18 - \log_b 9$

$\boxed{\log_b 2}$

11. Find the decimal approximation for the logarithm using the change of base property. Please show all work and for decimals, round to the nearest thousandth.

a. $\log_3 612$

$\frac{\log 612}{\log 3} = \boxed{5.841}$

b. $\log_{0.4} 0.064$

$\frac{\log 0.064}{\log 0.4} = 3$

12. Find the value of x in the equations below. For decimals, round to the nearest thousandth.

a. $5^x = 64$

$\log_5 64 = x$

$\frac{\log 64}{\log 5} = x$

$\boxed{2.584 = x}$

b. $e^{2.8} = x$

$\boxed{x = 16.445}$

c. $\ln 3.5x = 4.8$

$\frac{e^{4.8}}{3.5} = \frac{3.5x}{3.5}$

$\boxed{x = 34.717}$

d. $\log_5 6x = 3.2$

$\frac{5^{3.2}}{6} = \frac{6x}{6}$

$\boxed{x = 28.744}$

e.) $e^{-0.4x} = 3.4$

$\frac{\ln 3.4}{-.4} = \frac{-0.4x}{-0.4}$

$\boxed{x = -3.059}$

f. $\log 2.5^x = 53.8$

$\frac{x \log 2.5}{\log 2.5} = \frac{53.8}{\log 2.5}$

$\boxed{x = 135.196}$

13. (5pts) Find the formula for $f(x)$ in the following exponential function.

Given: $f(2) = 6$

$f(5) = 162$

$(2,6): \ 6 = ab^2$

$(5,162): \ 162 = ab^5$

$$\frac{162 = ab^5}{6 = ab^2}$$

$\sqrt[3]{27} = \sqrt[3]{b^3}$

$3 = b$

$\frac{6}{9} = \frac{a3^2}{9}$

$\frac{2}{3} = a$

$\boxed{y = \frac{2}{3}(3)^x}$

14. (5pts each) Find the following values for the given exponential function. $y = 2 \cdot 3^x$

a. $f(8) = 2 \cdot 3^8$

$\boxed{f(8) = 13122}$

b. $f(x) = 1458$

$\frac{1458}{2} = \frac{2 \cdot 3^x}{2}$

$729 = 3^x$

$\log_3 729 = x$

$\boxed{6 = x}$

Chapter 11

1. Write the formula for the following sequence: $-3, 5, 13, 21, \ldots$

$\underbrace{}_{8} \ \underbrace{}_{8}$

$t_1 = -3$

$d = 8$

$t_n = -3 + 8(n-1)$

$-3 + 8n - 8$

$\boxed{t_n = 8n - 11}$

2. Find the specified term of the arithmetic sequence: $100, 93, 86, \ldots, t_{27}$

$t_1 = 100$

$d = -7$

$t_{27} = ?$

$n = 27$

$t_{27} = 100 + (-7)(27-1)$

$= 100 - 182$

$\boxed{t_{27} = -82}$

3. Insert 4 arithmetic means between 89 and 71.5

$\boxed{89, \ 85.5, \ 82, \ 78.5, \ 75, \ 71.5}$

$t_1 = 89$

$t_6 = 71.5$

$71.5 = 89 + d(6-1)$

$-89 \quad -89$

$\frac{-17.5}{5} = \frac{5d}{5}$

$-3.5 = d$

4. Write the formula for the following sequence: $9, 36, 144, 576, \ldots$

$\times 4$

$t_1 = 9$

$r = 4$

$\boxed{t_n = 9(4)^{n-1}}$

5. Find the specified term of the geometric sequence: $-3, -12, -48, -192, \ldots, t_{10}$

$4 \quad 4$

$t_1 = -3$

$r = 4$

$t_{10} = ?$

$n = 10$

$t_{10} = -3(4)^{10-1}$

$\boxed{t_{10} = -786432}$

6. Insert four geometric means between 6 and -192

$\boxed{6, \underline{-12}, \underline{24}, \underline{-48}, \underline{96}, -192}$

$t_1 = 6$

$t_6 = -192$

$\frac{-192}{6} = \frac{6(r)^{6-1}}{6}$

$\sqrt[5]{-32} = \sqrt[5]{r^5}$ $r = -2$

7. Craig has taken a job with a starting salary of \$22,200 and annual raises of \$650. What will he be making in 24 years?

yr 1

$t_1 = 22,200$

$d = 650$

$t_{24} = ?$

$t_{24} = 22,200 + 650(24-1)$

$= 22,200 + 14950$

$\boxed{t_{24} = \$37,150}$

8. Bernice has taken a job with a starting salary of \$24,000 and annual rises of 4%. What will be her salary during her 8th year on the job?

yr 1

$t_1 = 24000$ $t_8 = 24000(1.04)^{8-1}$

$r = 1.04$

$t_8 = ?$

$\boxed{t_8 = \$31,582.36}$

9. Write the series in expanded form.

$\sum_{k=1}^{6}(7+5k) =$

$12 + 17 + 22 + 27 + 32 + 37$

$\sum_{n=4}^{10} 2(n+6) =$

$20 + 22 + 24 + 26 + 28 + 30 + 32$

$n=4$ $n=10$

10. Rewrite the series into sigma notation.

a. $5 + 14 + 23 + 32 + \cdots$

$t_1 = 5$ $t_n = 5 + 9(n-1)$

$n = \infty$ $= 5 + 9n - 9$

$d = 9$ $t_n = 9n - 4$

$\boxed{\sum_{k=1}^{\infty}(9k-4)}$

b. $5 + 10 + 15 + \cdots + 250$

$t_n = 5 + 5n - 5$

$t_n = 5n$

$t_1 = 5$ $250 = 5 + 5(n-1)$

-5 -5

$d = 5$ $\frac{245}{5} = \frac{5(n-1)}{5}$

$t_n = 250$ $49 = n - 1$ $n = 50$

$\boxed{\sum_{k=1}^{50} 5k}$

c. $1 + 4 + 9 + 16 + \cdots$

1 2 3 4

$n = \infty$

$\boxed{\sum_{k=1}^{\infty} k^2}$

d. $1 + 2 + 4 + 8 + \cdots + 64$

2 2 2

$t_n = 1(2)^{n-1}$

$t_1 = 1$

$r = 2$ $64 = 1(2)^{n-1}$

$t_n = 64$ $\log_2 64 = n - 1$

$n = 7$ $6 = n - 1$

$+1$ $+1$

$\boxed{\sum_{k=1}^{7} 2^{k-1}}$