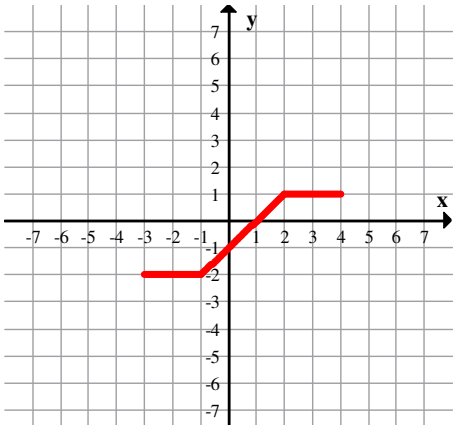
Pre-Calc 12
Midterm 1 Review **Name:**_____

Ch 1 Transformations

1. Given $y = f(x)$, sketch a graph of the following:
   a. $y = 2f(x+3)$
   b. $y = f(2x-4)-1$
   c. $y = -f\left(\frac{1}{3}x\right)+2$
   d. $y = f^{-1}(x)$
   e. $y = f(-x-1)$



2. Determine the equation of $y = 2x^2 - x + 3$ after a reflection in the:
   a. x-axis b. y-axis

3. If $(-2,3)$ is on the graph of $y = f(x)$, find a point that must be on:
   a. $y = f(-2x-6)-3$ b. $y = -f\left(\frac{1}{2}x-4\right)+2$
   c. $y = f^{-1}(x)+1$ d. $y = f^{-1}(x-1)-3$

4. Find the inverse of the following functions:
   a. $f(x) = \frac{1}{2}x+1$ b. $f(x) = \frac{2}{2x+3}$

5. Given $f(x) = 2x^2 + x + 3$ and $g(x) = 3x+1$, find:
   a. $f(x)+g(x)$ b. $(f-g)(x)$ c. $g(f(1))$
   d. $f(g(1))$ e. $g(f(-3))$ f. $(g \circ f)(x)$

Ch 2 Polynomials

1. Sketch and determine the domain of: $y = x(x-2)^2(x+1)$

2. Find the equation of the function with zeroes of $\frac{3}{2}, 4,$ and -1 and passing through $(2,3)$.

3. Factor fully: $f(x) = x^3 - 4x^2 - 7x + 10$

4. Solve by factoring:
   a. $2x^3 - 5x^2 - x + 6 = 0$ b. $2x^3 - 5x^2 - 11x = 4$ c. $2x^3 + 7x^2 + 2x = 3$

5. Solve:

   a. $-x(x+3)(2x-5) \geq 0$ b. $x^4 - 9x^2 \leq 0$

6. Find the remainder when $3x^3 + 4x^2 - x + 2$ is divided by $x+2$.

7. When $x^3 + kx^2 - 6x + 4$ is divided by $x-4$, the remainder is -36. Find the value of k.

8. Divide the following:

   a. $\dfrac{3x^3 - x^2 + 2x + 4}{x+4}$ b. $\left(x^4 - x^2 + 7\right) \div (x+1)$

9. A piece of cardstock 40cm long and 10cm wide is used to make an open top box by cutting a square from each corner. What is the length of square that must be cut from each corner if the volume of the box must be 408 cm^3.

Ch 3 Radical and Rational Functions

1. Find the domain and range for each:

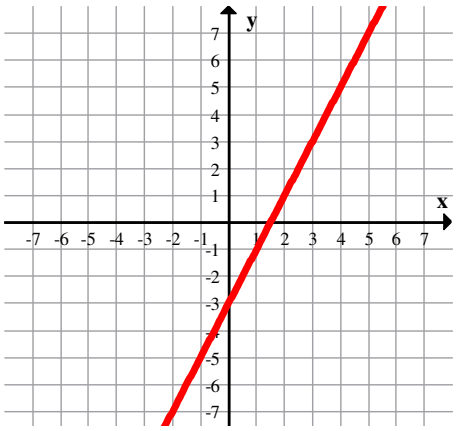
   a. $y = \sqrt{3-x}$ b. $y = -\sqrt{2x+7} - 1$ c. $f(x) = -\sqrt{-x} - 3$

2. Solve:

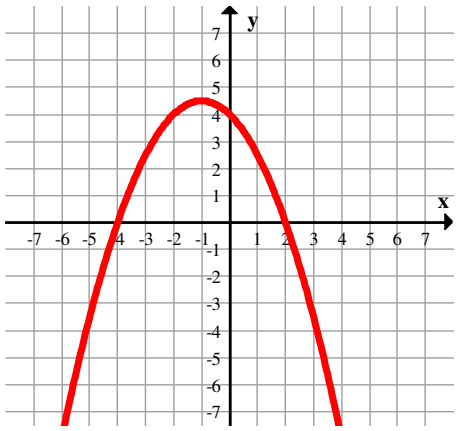
   a. $2\sqrt{x-3} + 5 = 15$ b. $\sqrt{x} + \sqrt{x-16} = 8$ c. $2x = \sqrt{x+3} - 5$

3. Given $y = f(x)$, sketch $y = \sqrt{f(x)}$:

   a.



   b.



4. Given the following functions, find the equations of all asymptotes, the coordinates of any holes, and the x and y-intercepts:

   a. $f(x) = \dfrac{1}{4} - \dfrac{1}{x-4}$ b. $f(x) = \dfrac{2}{x+1} + \dfrac{3}{x}$ c. $y = \dfrac{3x-2}{x+1}$

   d. $y = \dfrac{x^2 + 4x}{x^2 + 9x + 20}$ e. $y = \dfrac{x^2 + 6x + 8}{x^2 - 2x - 8}$

5. Sketch the following rational expressions. Label holes and asymptotes:

   a. $y = \dfrac{x^2+4x+4}{x^2+3x-10}$ b. $f(x) = \dfrac{2(3x-1)(x+4)}{3x^2+10x-8}$

Ch 4 Logarithms

1. Graph $y = 3^x$ and $y = 3^{x+1} - 2$. Find the domain, range and give the equations of any asymptotes.

2. Solve for *x*:

   a. $\left(\dfrac{1}{81}\right)^{3x-2} = 27^{2x-1}$ b. $2^{x^2} = \left(16^{x-1}\right)\left(2^x\right)$

3. Graph $y = \log_3 x$ and $y = \log_3(x+3) - 1$. Find the domain, range and give the equations of any asymptotes.

4. Find the value of *x*:

   a. $\log_{125} x = \dfrac{2}{3}$ b. $\log_9 \dfrac{1}{81} = x$ c. $\log_9 \dfrac{1}{27} = x$

   d. $\log_x 8 = \dfrac{3}{4}$ e. $6^{\log x} = \dfrac{1}{36}$ f. $\log_4 8^x = 8$

5. Solve:

   a. $2\log m + 3\log m = 10$ b. $\log_2(2m+4) - \log_2(m-1) = 3$

6. The point $(1024, 5)$ goes through the function $y = \log_a x$. What is *a*?

7. Solve to three decimal places: $8^{5x-2} = 69$.

8. The half-life of a substance is 23 days. How long will it be until the amount remaining is 10% of the initial amount?

9. Two earthquakes measure 7.7 and 6.3 on the Richter scale. How many times more powerful is the first than the second?

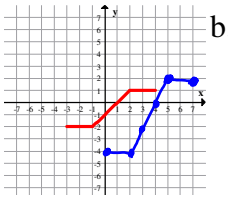
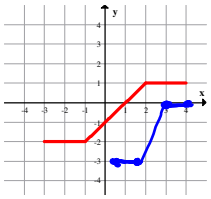
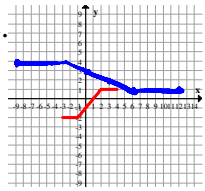
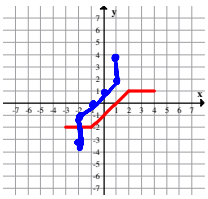
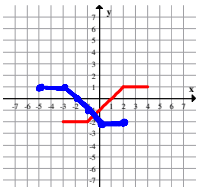
10. Simplify: $3^{2\log_3(2x+1)}$.

11. If $\log_3 x = 2$ and $\log_3 y = 5$, find:

    a. $\log_3\left(9x^2y\right)$ b. $\log_9\left(\dfrac{3x^2}{y}\right)$

Answer Key: ***(For FULL solutions, please look online.)***

Ch 1

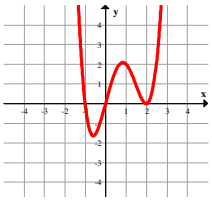
1. a.  b.  c.  d.  e. 

2. a. $y=-2x^2+x-3$ b. $y=2x^2+x+3$

3. a. $(-2,0)$ b. $(4,-1)$ c. $(3,-1)$ d. $(4,-5)$ 4. a. $y=2x-2$ b. $y=\frac{1}{x}-\frac{3}{2}$

5. a. $y=2x^2+4x+4$ b. $y=2x^2-2x+2$ c. 19 d. 39 e. 55 f. $6x^2+3x+10$

Ch2

1.  x is all real #s 2. $y=-\frac{1}{2}(2x-3)(x-4)(x+1)$

3. $f(x)=(x-1)(x-5)(x+2)$

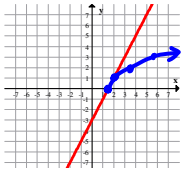
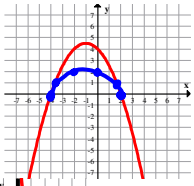
4. a. $x=-1,\frac{3}{2},2$ b. $x=-1,-\frac{1}{2},4$ c. $x=-3,-1,\frac{1}{2}$

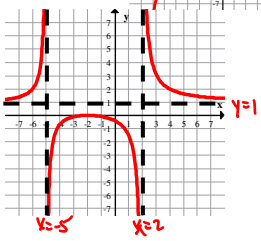
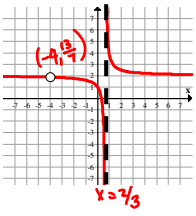
5. a. $x\le -3$, or $0\le x\le \frac{5}{2}$ b. $-3\le x\le 3$ 6. a. $f(-2)=-4$ 7. $k=-5$

8. a. $3x^2-13x+54-\frac{212}{x+4}$ b. $x^3-x^2+\frac{7}{x+1}$ 9. $x=3$cm or 1.67cm

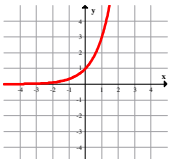
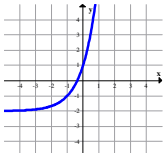
Ch3

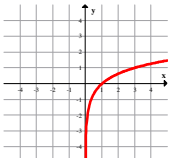
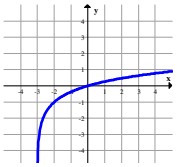
1. a. $x\le 3; y\ge 0$ b. $x\ge \frac{-7}{2}; y\le -1$ c. $x\le 0; y\le -3$

2. a. $x=28$ b. $x=25$ c. $x=3.804$ 3. a.  b. 

4. a. ha: y = ¼, va: $x=4$, x-int: (8,0), y-int: (0, ½)
   b. ha: $y=0$, va: $x=0, x=-1$, no intercepts
   c. ha: none, va: $x=-1$, x-int: $\left(\frac{2}{3},0\right)$, y-int: (0, –2) 5. a.  b. 

Ch4

1.   2. a. $x=\frac{11}{18}$ b. $x=1, x=4$

3.   4. a. $x=25$ b. $x=-2$ c. $x=-\frac{3}{2}$ d. $x=16$ e. $x=\frac{1}{100}$ f. $x=\frac{16}{3}$

5. a. $m=100$ b. $m=2$ 6. $a=4$ 7. $x=0.807$ 8. 76.4 days

9. 25.12 times more powerful 10. $(2x+1)^2=4x^2+4x+1$

11. a. 11 b. 0