Math 232: Final Exam Practice Problems   Name:_____
Due at the final exam: (20 pts on the final)

Note: Work the problems on other paper and attach it to this review sheet. All of the answers are posted under "Test Keys" for Math 232 at www.wrightmath.info

1. (6 pts) Find the intercepts of the function $f(x) = 2x - 5$
and graph it (by hand).

2. (3 pts) Determine whether the relation is a function. Explain how you are determining your answer.

$$\{(-2,5), (1,3), (5,-8), (-2,6), (4,0), (7,-9)\}$$

3. (6 pts) If Cuesta had 10,800 students in 2005 and 8,900 students in 2010, find the average rate of change of the number of students. Be sure to give units in your answer, including the word "per".

4.   (2 pts) Which of the functions shown are linear? Circle your answer.

x	$f(x)$	x	$g(x)$
1	5	1	5
2	15	2	10
3	25	3	20
4	35	4	40
5	45	5	80

(a) only f is linear   (b) only g is linear
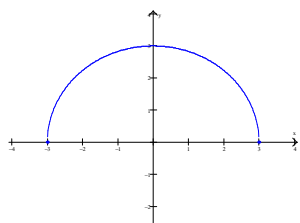
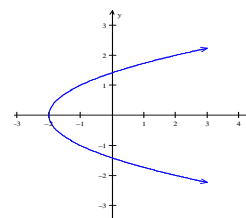(c) both f and g are linear   (d) neither f nor g is linear

5. (4 pts) (a) Determine whether the relation shown   (b) Determine whether the relation shown
in the graph is a function: in the graph is a function:

Function: Function:

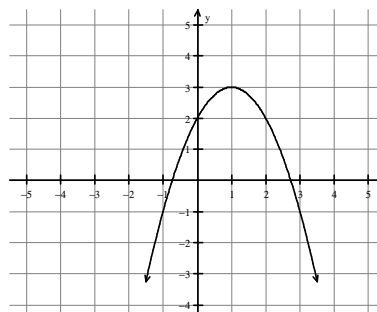yes   no   yes   no

6. (6 pts) Determine the domain of $g(x) = \dfrac{x-3}{x^2-4}$.

You may express your answer in any form.

7. (4 pts) Determine the domain and range of the function
 shown in the graph:

     Domain:_____

     Range:_____

8. (8 pts) Use the given function graph to find or estimate

$f(-1) =$ _____

$f(7) =$ _____

On what intervals (x-values!) is the function increasing?_____

On what intervals (x-values!) is the function constant?_____

On what intervals (x-values!) is the function decreasing?_____

9. (9 pts) Use your calculator to graph $f(x) = 0.2x^3 - x^2$ (a) Sketch a representative graph.

(b) Use your calculator to find the relative maximum and relative minimum of the function. Label these points(x,y) on the graph and fill in answers below.

The function has a relative minimum value of _____ located at _____

The function has a relative maximum value of _____ located at _____

(c) On what intervals (x-values!) is the function decreasing?_____

On what intervals (x-values!) is the function increasing?_____

10. (6 pts) If $f(x) = \begin{cases} \sqrt{x+2} & \text{for } x \geq -2 \\ x^2+1 & \text{for } x < -2 \end{cases}$ determine the following values:

$f(7) =$ _____ $f(-2) =$ _____ $f(-5) =$ _____

11. (8 pts) Graph the function (by hand!)

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

12. (12 pts) Given $f(x) = 2x - 10$ and $g(x) = x^2 - 5x + 6$.

Find each of the following. Simplify your answers.

$(f - g)(1)$ $(fg)(2)$

$\left(\frac{g}{f}\right)(5)$ $(f + g)(x)$

What is the domain of $(f + g)(x)$?

13. (12 pts) Graph each function on your calculator to determine the type of symmetry it has and whether the function is even, odd, or neither even nor odd.

Function	Type of Symmetry	Even, Odd, Neither
a) $f(x) = x^4 - 4x^2$		
b) $f(x) = x^3 - 5x + 3$		
c) $f(x) = \dfrac{1}{x}$		

14. (4 pts) Given the function $g(x) = \dfrac{x+1}{x^3 - 3}$

(a) Which would be the correct way to type this into your calculator (circle the correct answer)?

$y1 = x + 1 \div x^3 - 3$ or $y1 = (x+1) \div x^3 - 3$ or $y1 = x + 1 \div (x^3 - 3)$ or $y1 = (x+1) \div (x^3 - 3)$

(b) Use your calculator to evaluate the following:
$g(1.0723) = $ _____
$g(-3.7489) = $ _____

Math 232: Test 2-In Class
1. (3 pts) Parent graphs: Write the equation for each of the parent graphs described below.

Which parent graph looks like a "V" ? _____

Which parent graph has a "wiggle" ?_____

Which parent graph has a "U" shape?_____

Which parent graph is in the first quadrant, $x \geq 0$?_____

Which parent graph looks like the "wiggle", but is lying on its side?_____

2. (3 pts) Use a t-chart (table) to graph the function $f(x) = |x|$. You may check your graph with your calculator, but you must clearly show the table. Your t-chart should include both positive and negative x-values

3. (5 pts) Consider the function $g(x) = -2|x-1| + 3$ (You don't have to graph)

What is the parent function (parent graph) for g?_____

Does g have a **horizontal shift** of the parent graph?   Yes   No
If yes, what is the shift?_____
Is there any **vertical stretching or shrinking**?   Yes   No
If yes, what is the stretch/shrink?_____

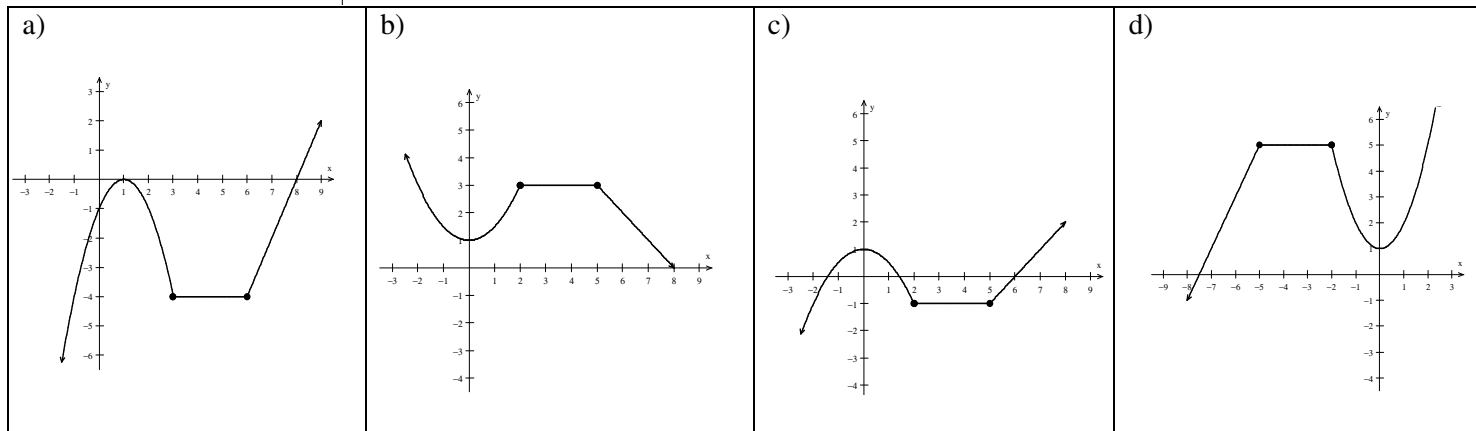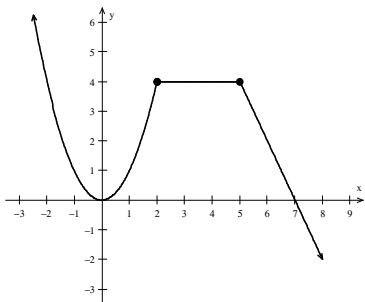Is there a **reflection** of the parent graph?   Yes   No
If yes, reflection is about which axis (x-axis or y-axis)?_____

Is there a **vertical shift** of the parent graph?

If yes, what is the shift?_____

4. (2 pts) The graph of the function f is shown. Which of the following is the graph of $g(x) = -f(x-1)$?

Graph of f:

a)	b)	c)	d)

5. (7 pts) For the graph of the function $f(x) = -x^2 + 2x + 3$, answer the following questions. Show work as indicated in the space provided. .

What is the vertex?_____
(show work)

What is the axis of symmetry?_____

What is the range of the function?_____

What is the y-intercept of the function?
(show work)

What are the x-intercepts of the function?
(show work)

Graph the function

6. (4 pts) A furniture company has determined that when x chairs (in hundreds) are built, the average cost per chair is given by $C = 0.1x^2 - 0.7x + 1.625$.

(a) How many chairs should they build to minimize the average cost, C? _____
    (show work)

(b) What would that minimum cost per chair be?_____
    (show work)

7. (6 pts) Solve the equation: $x - \dfrac{4x}{x+2} = \dfrac{8}{x+2}$

8. (4 pts) For $f(x) = 7x^2 - 5 - 2x^4 - 3x^3$, what is

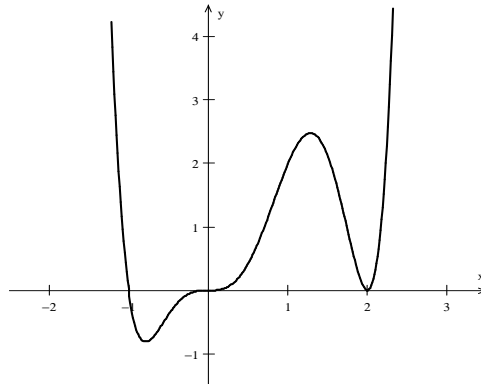the leading term_____

the leading coefficient_____

the degree_____

What is the end behavior of the function? Draw a little sketch to show it.

9. (2 pts) Give all the zeros and their multiplicity for the <u>sixth</u> degree polynomial function shown in the graph.

10. (8 pts) The function $f(x) = (x-4)^3 (x+3)^2$

    (a) What is the leading term of this function?_____

    (b) What is the end behavior of this function? (draw a little sketch)

    (c) What is the y-intercept of this function? (BIG number!)

    (d) What are the zeros and what is the multiplicity of each zero?

    (e) Graph the function <u>without using your calculator</u>. Clearly show the end (global) behavior and the local behavior <u>at the intercepts</u>. You don't need to find the maximum or minimum values, just the intercepts.

11. (4 pts) Find all of the zeros of the polynomial function:

$f(x) = x^4 + 36x^2$

12. (9 pts) (a) Given $p(x) = x^3 - x^2 - 4x - 6$, use Synthetic Division to divide by $(x-3)$

(b) Write $p(x) = x^3 - x^2 - 4x - 6$ in factored form, based on your answer above.

(c) Find all of the zeros of p(x).

13. (3 pts) Use the Factor Theorem to construct a polynomial of degree 5 that has zeros $3i$, 0, and $\sqrt{5}$

Math 232: Test 2 Take Home

1. (20 pts) Graph the following rational functions. Include vertical asymptotes, horizontal asymptotes, y-intercepts, and x-intercepts in your graph (show work for how you're finding these). Find and plot enough points to see how the graph fills in around the asymptotes.

Use a straight-edge to make your x and y-axes…your graphs should be beautiful!

(a) $y = \dfrac{3x+3}{x-2}$

(b) $y = \dfrac{1}{(x-1)^2}$

2. (10 points) A box is constructed by cutting 4 corners out of an 8½ by 5½ inch sheet of paper (standard notebook/printing paper, cut in half). Each of the cut-out corners has a side length of x inches (see picture).

(a) If the base are of the box has to be 18 square inches, find x. You'll need to set up and solve a quadratic equation…show work!

(3 points extra credit: After you find the x-value, take a piece of paper and actually construct the box. You'll need a ruler, scissors, and tape to do this.)
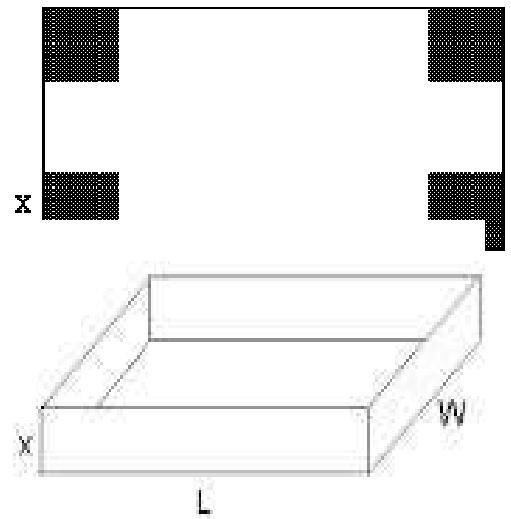
(b) Now you're going to make a new box where the base of the box can be any size. The volume of a box is given by the formula $V = l \cdot w \cdot h$ where l = length of the base, w = width of the base, and h = height of the box. The corners still have size x, as shown and you're still using that half sheet of paper (5½ by 8½ inches).

Find the formula for the volume based on x.

Use your calculator to find the x-value that gives you the maximum value for V (it's **_not_** a Quick Vertex problem…you'll have to use the CALC menu on your calculator to find x). Give both the x-value and the V-value (they'll both be decimals).Include units.

Math 232: Test 3-In Class

1. (3 pts) Solve the inequality using a sign chart: $(1-x)(x+4)(x-2) \leq 0$

2. (3 pts) Solve the inequality using a graph (use your calculator): $x^2 - 9 > 0$
Sketch a representative graph to show your work.

3. (3 pts) The function $s(t) = -16t^2 + 80t + 224$ gives the height s, in feet, of a model rocket launched from a hill, where t is the time in seconds.   For what times is the height greater than 320 feet?

4. (13 pts) Given $f(x) = x - 3$ and $g(x) = \dfrac{3x+2}{x}$, find and simplify each of the following:

(a) $f\left(g(1)\right)$

(b) $g\left(f(1)\right)$

(c) $g\left(f(x)\right)$

(d) What is the domain of $g\left(f(x)\right)$?

(e) Are f and g inverses? Explain how you can tell by using ONLY your answer from part (c).

5. (6 pts) (a) Is $f(x) = x^3 + 2$ one-to-one?   YES, it's one-to-one   NO, it's not one-to-one
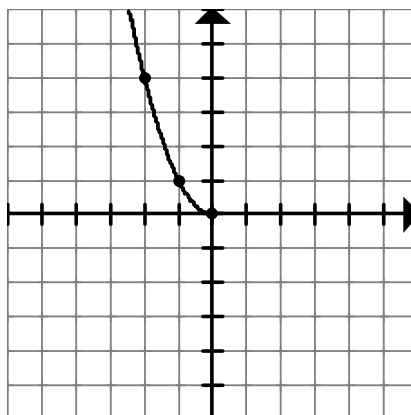
Sketch a representative graph of the function to justify your answer.

(b) Use algebra to find the formula for the inverse of $f(x) = x^3 + 2$. Use f^{-1} notation in your answer

6. (4 pts) Using the graph of f , as shown, fill in each table with 3 points and sketch the inverse of the function
Also sketch the line $y = x$ on the graph.

f

x	y

f^{-1}

x	y

7. (8 pts) (a) Graph the function $f(x) = e^x$ by filling in the table (use your calculator). Give the domain, range,
and the equation of the horizontal asymptote.

x	y
-2	
-1	
0	
1	
2	

Domain:

Range:

Horizontal asymptote:

(b) Describe the transformations that have occurred to f to make the function $g(x) = -e^x + 3$, then graph g on the same
grid as f .

Transformations:_____

What is the equation of the horizontal asymptote of g ?_____

7. (3 pts) Find each of the following, without using a calculator:

a) $\log_3 9 = $ _____

b) $\log 10^{1/4} = $ _____

c) $\log_2 \sqrt[3]{2} = $ _____

a) $10^{\log(12)} = $ _____

b) $\ln(e^{3x}) = $ _____

c) $\ln(e) = $ _____

8. (2 pts) Find each of the following by using a calculator. Round to four decimal places.

a) $\log 11 = $ _____

b) $\ln 3 = $ _____

9. (4 pts) Express as a single logarithm. Simplify as much as possible.

a) $\log(x) + \log(x+3)$

b) $\ln(x^2 - 4) - \ln(x+2)$

10. (2 pts) What is the domain of the function $f(x) = \ln(x+2)$?_____

11. (8 pts) Solve the equations:

(a) $\log(x+8) = 2$

(b) $e^{2x} = 15$

12. (3 pts) In chemistry, the pH of a substance is defined as $pH = -\log[H+]$, where $H+ = $ the hydrogen ion concentration. Find the pH of milk, if the hydrogen ion concentration is 2.3×10^{-6}

13. (6 pts) The population of Papua, New Guinea was 6.188 million in 2011, and the exponential growth rate is 1.985% per year.

(a) Find the exponential growth function, using the formula $P = P_0 e^{kt}$

(b) Estimate what the population will be in 2020.

(c) How long will it take for the population to double?

14. (2 pts) The average walking speed, w, in feet per second, of a person living in a city with population P, in thousands,
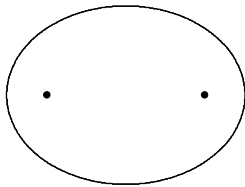
is given by this function : $w(P) = 0.36 \ln(P) + 0.05$

The population of Wichita, Kansas, is 353,823 (hint: 353.823 *thousand*). Use the formula to find the walking speed of the people in this city.

1. (2 pts) Illustrate the reflection properties of each of the conic sections shown below. The dot represents the focal points.

      (a) Ellipse   (b) Parabola

2. (6 points) Graph the ellipse given by the following equation. Include the foci in your graph. .

$$\frac{x^2}{9}+\frac{y^2}{16}=1$$ Graph:

Vertices:_____

Foci:_____

3. (4 points)   Sketch then find the equation of the circle that passes through the given points:
  (3, 5), (3, -1), (0, 2) , (6, 2).

4. (4 points) Graph the parabola given by the equation $y^2 = 8x$. Include the vertex, focus, and axis of symmetry, in your graph.
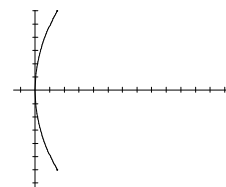
                                          Graph:

Vertex:_____

Focus:_____

Axis of symmetry:_____

5. (4 pts) A satellite dish has a parabolic cross section that is 12 feet wide at the opening and 1.5 feet deep (see picture below). Use algebra to determine where the receiver should be placed relative to the vertex. Mark where this point on the picture.

Sample Problem from Systems review and Section 6.3:

1. Find the solution to the system by graphing.   Check your answer. Show the check!
       $3x-2y=-12$
       $2x-3y=-10$

2. Write the system as a matrix then solve it by putting into Reduced Row Echelon Form:

$4x-y-3z=1$

$8x+y-z=5$

$2x+y+2z=5$