Precalculus Exam 1, Fall 2013. 1.1-2.2. Name_____

class hour or section number or instructor _____

Show clear supporting work on problems with several steps. Algebraic problems that display little or no supporting work will get **little or no credit**. You do not need to show work on one-step calculator problems. To solve numerical problems guess-and-check is legal unless you are requested to solve them "algebraically." Find numerical answers with at least three correct significant digits:

Problem	points	score
1	8	
2	10	
3	4	
4	5	
5	6	
6	4	
7	5	
8	10	
9	6	
10	11	
11	6	
12	6	
13	9	
14	6	
15	4	
total	100	

1. (8 pts) Evaluate, with at least three correct significant digits

a) Let $c = -1.45$

$$\frac{2.63 + \sqrt{c^2 + 3(2.58)}}{4.56 - 2.89} =$$

b) Let $b = 9.2$, $c = -2.4$, and $d = 5.39$. Evaluate

$$\frac{b + cd}{1.7 + \sqrt{d^2 + cb}} =$$

2. (10 pts) Short answer

a) What is the technical term for a graph which is not misleading?

b) What is the technical term for the type of problem which suggests operations you are not supposed to actually do – rather you are supposed to write about the operations?

c) In the plane, if P is directly to the right of (a, b) and directly above (c, d), what are the coordinates of P?

d) Let $h(x) = (x - 5)^4$. Find simpler f and g such that $h(x) = f(g(x))$.

$f(x) =$ $g(x) =$

3. (4 pts) Suppose you graph $f(x)$ in the standard window ([-10, 10] by [-10, 10]) and the graph appears shorter than you would like. You want it to appear taller in the window. You have the best chance of getting what you want if you (pick one)

a) Change the y-interval to [-20, 20] b) Change the y-interval to [-5, 5]

c) Change the x-interval to [-20, 20] d) Change the x-interval to [-5, 5].

4. (5 pts) Let ⊠ be defined by this definition: $x \boxtimes y = x(y - 2)$, for all x and y.

Solve for x: $5 \boxtimes x = x \boxtimes 4$.

5. (6 pts) State, symbolically, as in Section 1.4 on writing mathematics, the **method** which expresses how to add any two fractions. [Use no regular English words. Use mathematical symbols.]

6. (4 pts) Here is a theorem: $a < x < b$ iff $\left| x - \frac{a+b}{2} \right| < \frac{b-a}{2}$

Use it to rewrite: $5 < x < 8$.

7. (5 pts) Is it best to multiply out the expression on the left in order to solve the equation algebraically? Answer "yes" or "no" [Do not solve it.]

a) $(x+1)^2 + x = 5$.

b) $(x+1)^3 - 9 = 0$.

c) $(x+1)^3 - 5(x+1) = 0$.

d) $(x+1)(x+2) - (x+1)(3x-5) = 0$.

e) $(x+1)(x+2) - (x+3)(2x+4) = 0$.

8. (10 pts) There are four ways to solve equations. Inverse-Reverse (IR), Zero Product Rule (ZPR), Quadratic Formula (QF), and Guess and Check (GC). For each of the following name the **algebraic method best suited** to solving the equation. If and only if none of the three algebraic methods work, pick GC. Do NOT solve these! Name the method (abbreviations are ok)!

a) $(x-3)(x-4) = 5.3$

b) $5(x^3 - 3) = 97$

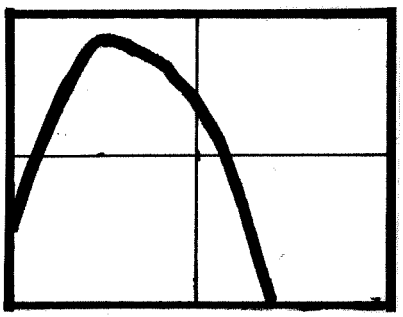
c) $(x^2 - 3)(x+6) = (x^2 - 3)(2x-1)$

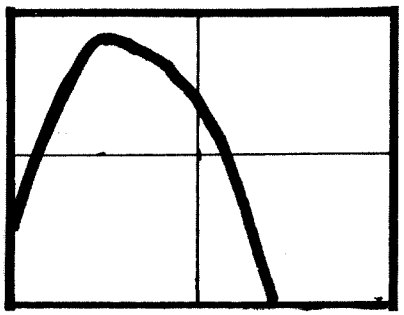
d) $(3x-2)^3 = 5x$.

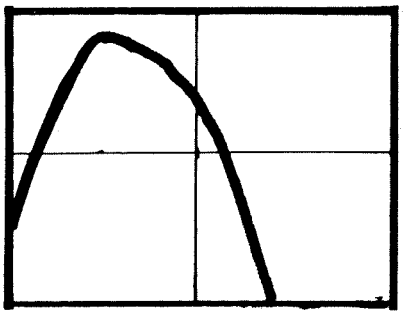
e) $\cos(2x-5) = -0.4$

9. (6 pts) a) Solve: $5 \ln(4x) - x = 0$. b) State or show, briefly, how you did it so we can tell what you did.

13. (9 pts) Here is a representative graph of $f(x)$ on the standard scale. It is repeated three times. Graph, on the same axis-system, these three: a) $f(x) - 2$ b) $f(-x)$ c) $f(x - 3)$.







a) $f(x) - 2$ b) $f(-x)$ c) $f(x - 3)$

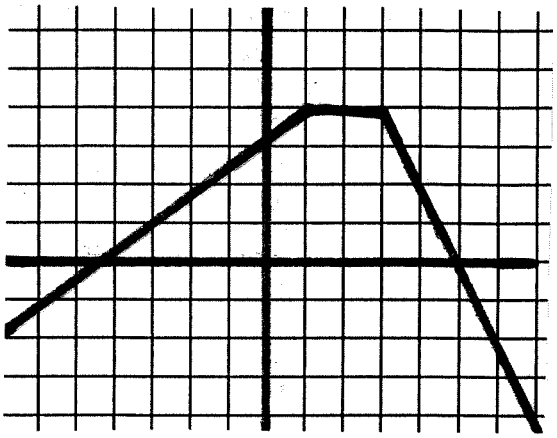
14. (6 pts) Here is a theorem. Read it and use it to answer parts (a) and (b).
Theorem: If $f(x) = kx^p$, then the derivative of f is denoted f' and given by $f'(x) = kpx^{p-1}$.

a) Give the derivative of f if $f(x) = 3x^5$.

b) Suppose $f(x) = \dfrac{x^{1/3}}{5}$. For this f, give $f'(x)$.

15. (4 pts) Suppose all you know about f is that $f(3) = 8$.
Find one point on the graph of $y = f(2x)$

10. (11 pts) Here is a representative graph of f.
The grid lines are one unit apart.
[Approximate answers are good enough.]



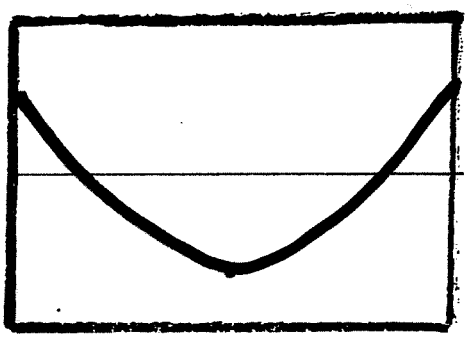
a) Find $f(2)$.

b) Solve for x: $f(x) = 1$.

c) Solve for x: $f(x) < 0$.

d) Solve for x: $f(x) = x$

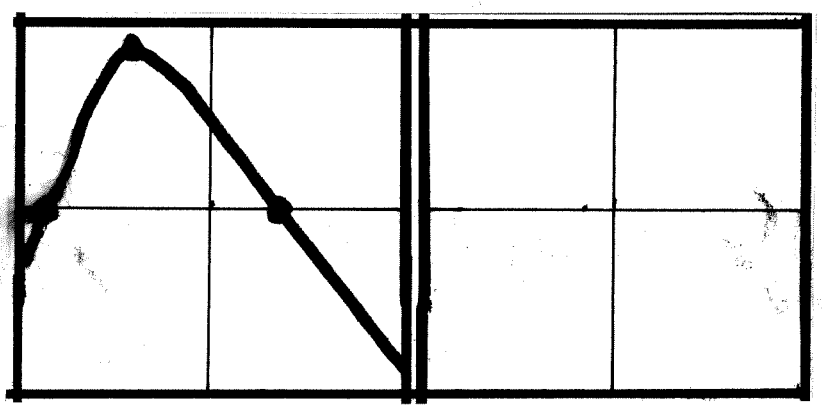
11. (6 pts) Here is the graph of $y = (x - 5)(x - 25)(x - 27)$ in a certain window. Find the window. Make the x-axis in the middle vertically (as shown) and reproduce the position of the minimum, and the fact the graph exits the window from the sides without going out the top.
[Approximate answers with these features are good enough.]



The x-interval has x_{min} = and x_{max} =

The y-interval has y_{min} = and y_{max} =

12. (6 pts) Here is a representative graph in the standard window [-10, 10] by [-10, 10]. Sketch how it would appear on the window [-5, 5] by [-20, 20]. Be sure to get the three emphasized points right.



standard window [-5, 5] by [-20, 20].