Name: Key
Recitation Instructor:
Recitation Day and Time:

College Algebra – Exam 2 – October 14, 2008

Page 1 22 pts.	Page 2 30 pts.	Page 3 22 pts.	Page 4 26 pts.	TOTAL 100 pts

Directions: You will find 14 problems listed below. Please show all your work neatly and box your final answers. No notes or books are allowed. You have one hour to complete this exam.

1. (8 points) Find an equation of the line parallel to $3x - 6y = 12$, passing through the point $(2, 1)$.

Slope of given line: $\frac{-6y}{-6} = \frac{-3x}{-6} + \frac{12}{-6}$

$m = \frac{1}{2}$ $\quad y = \frac{1}{2}x - 2$

Equation ~~Slope~~ of new line: $y - y_0 = m(x - x_0)$

$y - 1 = \frac{1}{2}(x - 2)$ or $y = \frac{1}{2}x$

2. (6 points) Determine whether the following function is even, odd, or neither: $f(x) = 6x^3 + 7x$. You must show your work with algebra; drawing the graph alone will not receive full credit.

$f(-x) = 6(-x)^3 + 7(-x) = -6x^3 - 7x$

$-f(x) = -(6x^3 + 7x) = -6x^3 - 7x$

Since $f(-x) = -f(x)$, $f(x)$ is odd.

3. (8 points) Given $g(t) = t^2 - 3t + 2$ and $h(x) = 2x + 3$, find the following and simplify completely:

(a) $g(h(x)) = g(2x+3) = (2x+3)^2 - 3(2x+3) + 2$

$= 4x^2 + 12x + 9 - 6x - 9 + 2$

$= \boxed{4x^2 + 6x + 2}$

(b) $h(h(-4))$ $\quad h(-4) = 2(-4) + 3 = -8 + 3 = -5$

$h(h(-4)) = h(-5) = 2(-5) + 3 = -10 + 3 = \boxed{-7}$

4. (8 points) Given $f(x) = 2x^2 + 4x - 1$ and $g(x) = 3x^2 - x$, find $(f \cdot g)(x)$ and simplify completely.

$$(f \cdot g)(x) = f(x) \cdot g(x) = (2x^2 + 4x - 1)(3x^2 - x)$$
$$= 6x^4 + 12x^3 - 3x^2 - 2x^3 - 4x^2 + x$$
$$= \boxed{6x^4 + 10x^3 - 7x^2 + x}$$

5. (6 points) Find an equation for the graph that has the shape of $|x|$, but shifted left 7 units and up 4 units.

$$f(x) = |x + 7| + 4$$

6. (8 points) Solve the following equation by factoring: $2x^2 - 9x - 5 = 0$.

$$(2x + 1)(x - 5) = 0$$
$$2x + 1 = 0 \quad \text{or} \quad x - 5 = 0$$
$$2x = -1$$
$$\boxed{x = -1/2 \quad \text{or} \quad x = 5}$$

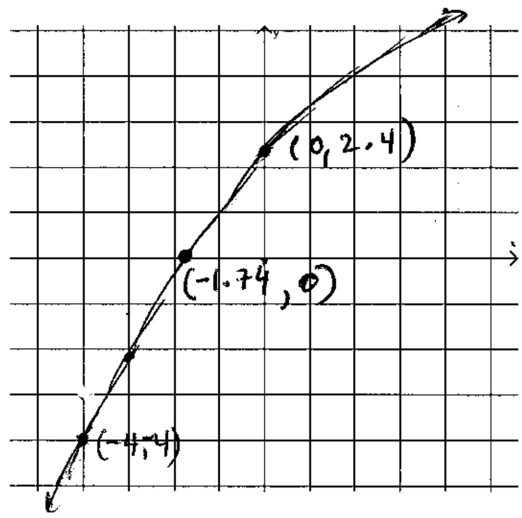
7. (8 points) Find an equation of the parabola with vertex at $(-1, -3)$, passing through the point $(-2, -1)$. Write answer in the form $y = ax^2 + bx + c$.

$$y = a(x - h)^2 + k$$
$$y = a(x + 1)^2 - 3$$
$$-1 = a(-2 + 1)^2 - 3$$
$$-1 = a - 3$$
$$2 = a$$

$$y = 2(x + 1)^2 - 3$$
$$y = 2(x^2 + 2x + 1) - 3$$
$$y = 2x^2 + 4x + 2 - 3$$
$$\boxed{y = 2x^2 + 4x - 1}$$

8. (8 points)

(a) Using your calculator, graph $f(x) = -.1x^2 + 1.2x + 2.4$ over the following intervals: $-5 \le x \le 5$ and $-5 \le y \le 5$. Label all intercepts clearly.



(b) What features of the graph of $f(x)$ are missing in this viewing window?

Since $a < 0$ for this quadratic function, the window is missing the maximum value (vertex), as well as another x-intercept.

9. (8 points) The distance in feet of a ball above the ground t seconds after it is thrown is given by the function $s(t) = -16t^2 + 64t$. When does the ball reach its maximum height, and what is the maximum height? You must show all your work using algebra.

Method 1: Completing the square:

$s(t) = -16(t^2 - 4t + 4) + 64$

$s(t) = -16(t-2)^2 + 64$

Vertex: $(2, 64)$

$\boxed{\text{Max height of 64 ft @ } t = 2 \text{ seconds.}}$

Method 2: Vertex formula

(h, k), where $h = -b/2a$, $k = s(h)$.

$h = -64/2(-16) = 2$ seconds

$k = s(2) = -16(2)^2 + 64(2) = 64$ ft.

10. (6 points) Simplify and write in standard form: $(5 - 2i)(6 - i)$

$= 30 - 5i - 12i + 2i^2$

$= 30 - 17i - 2$

$= \boxed{28 - 17i}$

11. (6 points) Find the zeros of the function $f(x) = 3x^2 + 7x + 2$.

$$3x^2+7x+2=0$$
$$(3x+1)(x+2)=0$$
$$3x+1=0 \quad \text{or} \quad x+2=0$$
$$3x=-1$$
$$\boxed{x=-1/3 \quad \text{or} \quad x=-2}$$

12. (6 points) Solve for x and check your answers: $\sqrt{5x-1} = 7$.

$$5x-1=49$$
$$5x=50$$
$$\boxed{x=10}$$

Check: $\sqrt{5(10)-1} = \sqrt{50-1} = \sqrt{49} = 7$ ✓

13. (8 points) Solve for x and check your answers: $|2x-3| + 4 = 7$.

$|2x-3| = 3$;

$$2x-3=3 \quad \text{or} \quad 2x-3=-3$$
$$2x=6 \qquad\qquad 2x=0$$
$$\boxed{x=3 \quad \text{or} \quad x=0}$$

Both Work.

Check: $x=3$: $|2(3)-3|+4 = |3|+4 = 7$ ✓

$x=0$: $|0-3|+4 = |-3|+4 = 7$ ✓

14. (6 points) Graph the following piecewise-defined function: $f(x) = \begin{cases} x^2, & x > 0 \\ x-1, & x \le 0 \end{cases}$.