Name: Key

Recitation Instructor and Time: ____________

Studio College Algebra – Exam 2
October 13, 2009

Directions: There are 16 problems on this exam. Please show all your work.

1. Solve: $2x^2 - 5x - 3 = 0$.

$(2x+1)(x-3) = 0$

$2x+1=0$ $\quad$ $x-3=0$

$2x=-1$ $\quad$ or $\quad$ $x=3$

$x=-1/2$

$\boxed{x=-1/2 \text{ or } x=3}$

2. Write $x^2 - 12x - 11$ in the form $a(x-h)^2 + k$.

$x^2 - 12x + \left(\frac{12}{2}\right)^2 - \left(\frac{12}{2}\right)^2 - 11$

$= x^2 - 12x + 36 - 36 - 11$

$= \boxed{(x-6)^2 - 47}$

or

$(x-h)^2 + k = x^2 - 2hx + h^2 + k$

$-2h = -12$

$h = 6$.

$h^2 + k = -11$

$6^2 + k = -11$

$36 + k = -11$

$k = -47$

$(x-h)^2 + k$ gives

$\boxed{(x-6)^2 - 47}$

Name: ______________________

3. The parabola given below has vertex at (2,3) and passes through the point (1,1). Find an equation of the parabola in the form $y = a(x-h)^2 + k$.

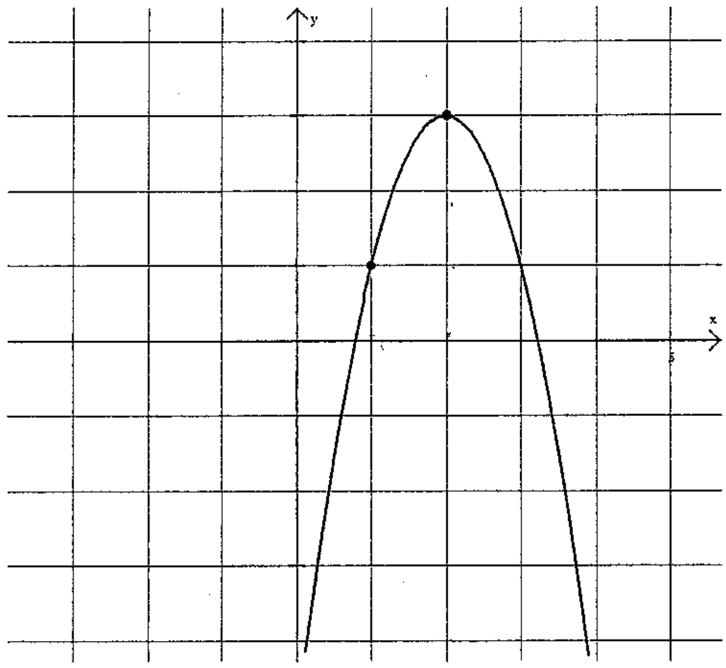
$y = a(x-2)^2 + 3$

$1 = a(1-2)^2 + 3$

$1 = a(1) + 3$

$-2 = a$

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



4. The function $s(t) = -16t^2 + 400$ gives the distance (in feet) above the ground of an object, t seconds after it was thrown. When does the ball hit the ground? *(Hint: When the ball hits the ground, what is the distance off the ground?)*

$0 = -16t^2 + 400$

$0 = -16(t^2 - 25)$

$0 = -16(t-5)(t+5)$

$\boxed{t = 5 \text{ seconds}}$

You could use the quadratic formula also

Name: ______________________

5. Let $f(x) = 2x^2 - 3x - 2$ and $g(x) = 5x + 1$. Answer the following:

a) Compute $f(x)g(x)$.

	$2x^2$	$-3x$	-2
$5x$	$10x^3$	$-15x^2$	$-10x$
1	$2x^2$	$-3x$	-2

$\boxed{10x^3 - 13x^2 - 13x - 2}$

b) Compute $g(f(x))$.

$g(2x^2 - 3x - 2) = 5(2x^2 - 3x - 2) + 1$

$= 10x^2 - 15x - 10 + 1$

$= \boxed{10x^2 - 15x - 9}$

6. Using the table at the right, evaluate the following:

x	$f(x)$	$g(x)$
-2	0	8
-1	-1	-5
0	-5	2
1	8	-1
2	-2	-2

$f(g(0)) =$ $f(2) = \boxed{-2}$

$g(f(2)) =$ $g(-2) = \boxed{8}$

Name: ______________________________

7. Given $f(x) = x^2 + 7$ on the domain $x \geq 0$, find $f^{-1}(x)$.

$y = x^2 + 7$

$x = y^2 + 7$

$x - 7 = y^2$

$\sqrt{x-7} = y$ only positive answer needed

$\boxed{f^{-1}(x) = \sqrt{x-7}}$

8. Solve and check your answers: $|x-3| = 4x + 9$

$x - 3 = 4x + 9$ or $x - 3 = -4x - 9$

$-12 = 3x$ or $5x = -6$

$x = -4$ $x = -6/5$

Check: $|-4-3| = 7$

$4(-4) + 7 = -7$

$x = -4$ doesn't work

$\left|-\frac{6}{5} - \frac{15}{5}\right| = 21/5$

$-\frac{24}{5} + \frac{45}{5} = \frac{21}{5}$

$\boxed{x = -6/5 \text{ works}}$

9. Solve: $|9x - 2| > 25$

$9x - 2 > 25$ or $9x - 2 < -25$

$9x > 27$ or $9x < -23$

$\boxed{x > 3 \text{ or } x < -23/9}$

Name: ______________________________

10. Solve and check your answers: $x-2=\sqrt{2-x}$

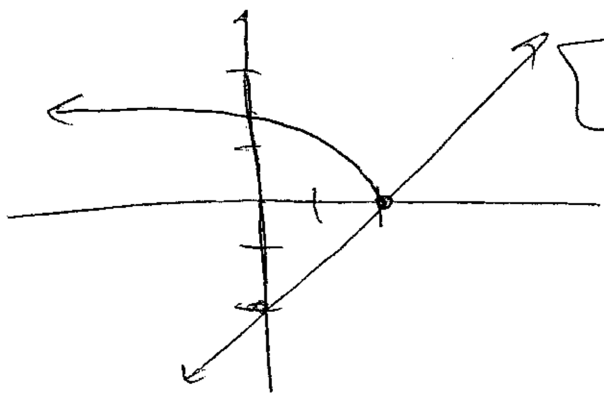
$$x^2-4x+4=2-x$$

$$x^2-3x+2=0$$

$$(x-2)(x-1)=0$$

$$x=2 \quad \text{or} \quad x=1$$

Check:



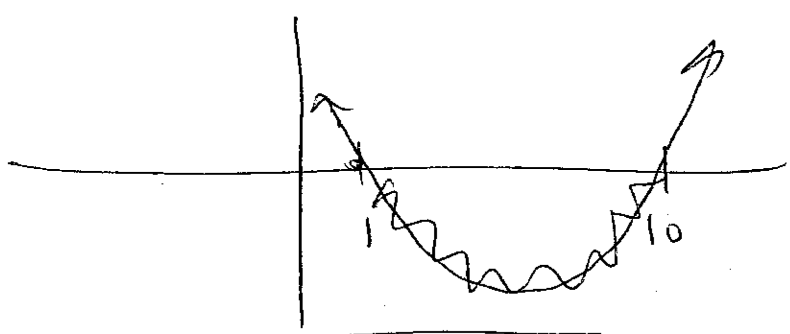
$\boxed{x=2 \text{ only works}}$

11. Solve the quadratic inequality $x^2-11x+10<0$

$$(x-10)(x-1)<0$$

zeros are $x=10$ and $x=1$

parabola opens upward since $a>0$.



Solution: $\boxed{1 < x < 10}$

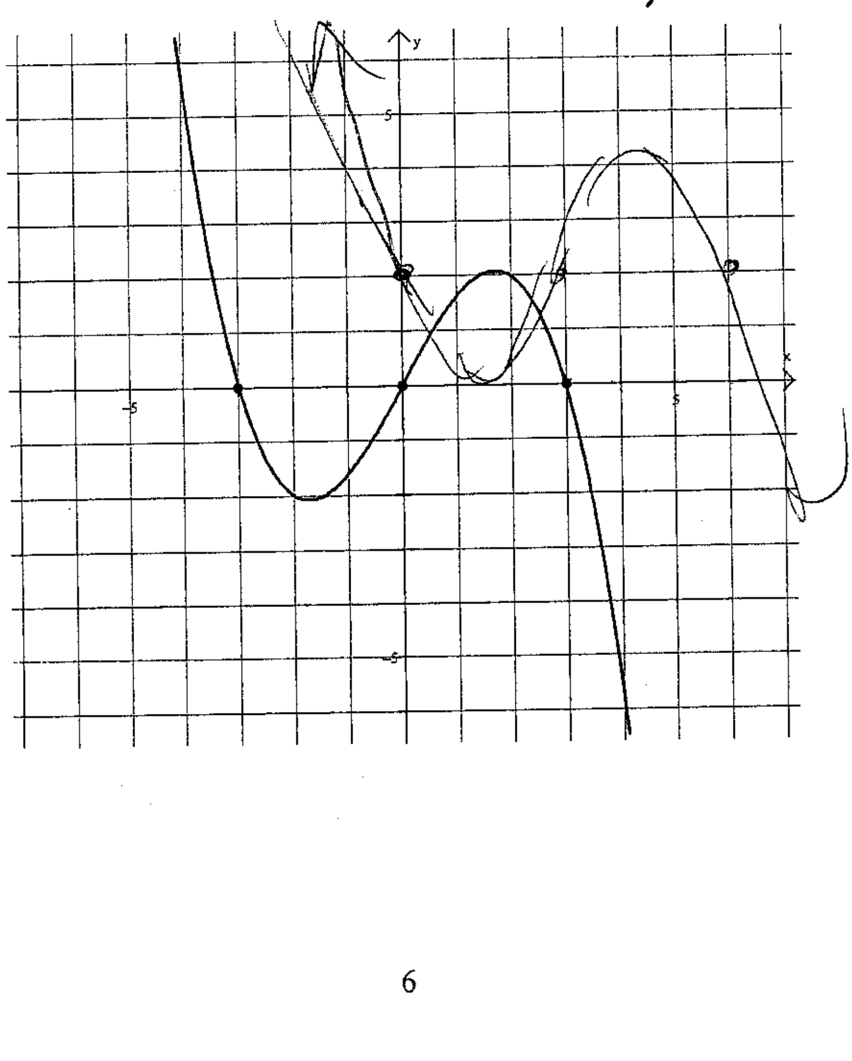
Name: ______________________

12. Suppose the total cost function for the production of Ipods is $C(x) = 22592 + 186x$, where x is the number of Ipods produced and $C(x)$ is the total cost in dollars. Compute the average cost function for the production of an Ipod.

$$a(x) = \frac{C(x)}{x} = \frac{22592 + 186x}{x}$$

$$\boxed{a(x) = \frac{22592}{x} + 186}$$

13. Given $f(x)$ below, graph $f(x-3)+2$ on the same set of axes.



Name: ______________________

14. Sports cars are designed so that the driver's seat is comfortable for persons with height 5 feet 8 inches, plus or minus 8 inches.

a) Write an absolute value inequality that gives the height *x*, in inches, of a person who will be comfortable.

$5'8'' = 68''$ $|x-68| \leq 8$

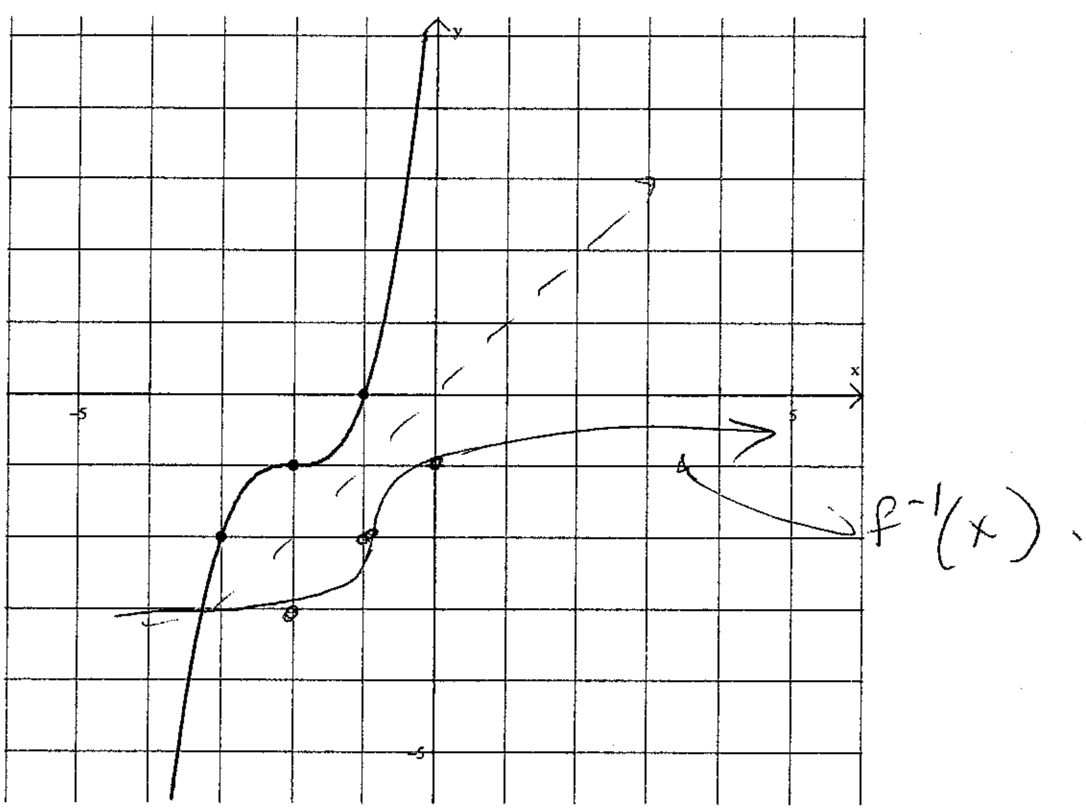
b) Solve this inequality for *x* to identify the heights of people who are comfortable.

$-8 \leq x-68 \leq 8$ $-8 \leq x-68$ and $x-68 \leq 8$

$60 \leq x \leq 76$ $60 \leq x$ and $x \leq 76$

If the person is between 60 inches and 76 inches tall, he/she will be comfortable.

15. Given *f(x)* below, draw $f^{-1}(x)$ on the same plot.



Name: ______________________________

16. The demand for a product is given by $p = 7000 - 2x$ dollars, and the supply for this product is given by $p = .01x^2 + 2x + 1000$, where x is the number of units demanded and supplied when the price per unit is p dollars. Find the equilibrium quantity and price.

$$.01x^2 + 2x + 1000 = 7000 - 2x$$

$$.01x^2 + 4x - 6000 = 0$$

$$x = \frac{-4 \pm \sqrt{16 - 4(.01)(-600)}}{2(.01)}$$

$$x = \frac{-4 \pm \sqrt{256}}{.02}$$

$$x = \frac{-4 \pm 16}{.02}$$

$$x = \frac{-20}{.02} \quad \text{or} \quad x = \frac{12}{.02}$$

$$x = \cancel{-1000} \quad \text{or} \quad 600$$

$$p = 7000 - 2x$$

$$p = 7000 - 2(600)$$

$$p = \$5800$$

$$\boxed{x = 600 \text{ units}; \ \$5800}$$

Eq. quantity

Eq price