Math 130 Fall 2007 Name:

QUIZ #1 @ 85 points

Write neatly. Show all work. **Write all responses on separate paper. Please write only on one side and clearly label the exercises.**

1) Solve the following equation by the zero-factor property (by factoring): $x^2 - 5x + 6 = 0$

2) Solve the following equation by the square root property. Give exact answers. $2 - 5(x+1)^2 = 18$

3) Solve the following equation by completing the square. Give exact answers. $3x^2 - 5x - 1 = 0$

4) Solve the following equation by the quadratic formula. Give exact answers. $3 - \frac{4}{x} - \frac{2}{x^2} = 0$

5) Solve the following equation. Write any restrictions that might apply. $\frac{2x-5}{x} = \frac{x-2}{3}$

6) Solve the following equation. Make sure to check the solutions. $\sqrt{x} - \sqrt{x-12} = 2$

7) Solve the following inequality. Write the solution set in interval notation. $x^2 - x - 6 > 0$

8) Solve the following inequality. Write the solution set in interval notation. $\frac{x+1}{x-4} > 0$

9) $f(x) = x^2 - 2x + 5$, $g(x) = \frac{2x-5}{x+1}$. Find the following:

a) The domain of f and g.

b) Find $f(-x)$, $f(a+h)$, and $g(2x)$.

10) Suppose $v(t) = -t^2 + 3t$ gives the velocity, in ft/sec, of an object at time *t*, in seconds.

a) Is *v* a function of *t*? Explain.

b) Which variable is independent and which one is dependent?

c) What is $v(0)$ and what does it represent?

d) What is $v(1)$ and what does it represent?

MATH 130

Quiz # 1 - SOLUTIONS

① $x^2 - 5x + 6 = 0$

Solve by factoring

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

$x-2=0$ OR $x-3=0$

$x=2$ $\quad$ $x=3$

$\boxed{x \in \{2,3\}}$

② Solve by square-root property:

$2-5(x-1)^2 = 18$

$2-18 = 5(x-1)^2$

$(x-1)^2 = \frac{-16}{5}$

$\sqrt{(x-1)^2} = \sqrt{\frac{-16}{5}}$

$x-1 = \pm \frac{4i}{\sqrt{5}}$

$\boxed{x = 1 \pm \frac{4\sqrt{5}}{5} i}$

③ Solve by completing the square:

$3x^2 - 5x - 1 = 0$

$3x^2 - 5x = 1 \quad / \div 3$

$x^2 - \frac{5}{3}x = \frac{1}{3}$

$\left(\frac{1}{2}\text{ coef. } x\right)^2 = \left(\frac{1}{2}\cdot\frac{5}{3}\right)^2 = \frac{25}{36}$

$x^2 - \frac{5}{3}x + \frac{25}{36} = \overset{12}{\frac{1}{3}} + \frac{25}{36}$

$\left(x - \frac{5}{6}\right)^2 = \frac{37}{36}$

$\sqrt{\left(x-\frac{5}{6}\right)^2} = \sqrt{\frac{37}{36}}$

$x - \frac{5}{6} = \pm \frac{\sqrt{37}}{6}$

$\boxed{x = \frac{5 \pm \sqrt{37}}{6}}$

(4) Solve by quadratic formula:

$3 - \frac{4}{x} - \frac{2}{x^2} = 0 \quad / \cdot x^2$

$x \neq 0$

$3x^2 - 4x - 2 = 0$ $\quad \left\{ \begin{array}{l} a=3 \\ b=-4 \\ c=-2 \end{array} \right.$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{4 \pm \sqrt{16 - 4(3)(-2)}}{2(3)}$

$x = \frac{4 \pm \sqrt{40}}{6} = \frac{4 \pm 2\sqrt{10}}{6}$

$= \frac{2(2 \pm \sqrt{10})}{6}$

$\boxed{x = \frac{2 \pm \sqrt{10}}{3}}$

(5) $\dfrac{2x-5}{x} = \dfrac{x-2}{3}$

condition: $x \neq 0$

$$3(2x-5) = x(x-2)$$
$$6x-15 = x^2-2x$$
$$x^2-8x+15=0$$
$$(x-3)(x-5)=0$$
$$x-3=0 \quad \text{OR} \quad x-5=0$$
$$x=3 \qquad\qquad x=5$$
$$\boxed{x \in \{3,5\}}$$

(6) $\sqrt{x} - \sqrt{x-12} = 2$

$$\sqrt{x} - 2 = \sqrt{x-12} \quad \Big/^{2}$$
$$(\sqrt{x}-2)^2 = (\sqrt{x-12})^2$$
$$\cancel{x} - 4\sqrt{x} + 4 = \cancel{x} - 12$$
$$-4\sqrt{x} = -16$$
$$\sqrt{x} = 4.$$
$$(\sqrt{x})^2 = 4^2$$
$$x = 16$$

check: $\sqrt{16} - \sqrt{16-12} \overset{?}{=} 2$

$4-2=2$ true

$$\boxed{x \in \{16\}}$$

(7) $x^2 - x - 6 > 0$

let $y = x^2-x-6$

The graph of $y = x^2-x-6$ is a parabola that opens upwards

x-int: $x^2-x-6=0$

$$(x-3)(x+2)=0$$
$$x=3, \quad x=-2$$

Therefore, $x^2-x-6>0$ iff

$$\boxed{x \in (-\infty,-2) \cup (3,\infty)}$$

(8) $\dfrac{x+1}{x-4} > 0$

x	$-\infty$		-1		4		∞
$x+1$	$-$	$-$	0	$+$	$+$		$+$
$x-4$	$-$	$-$	$-$	$-$	$\vert$	$+$	$+$
$\frac{x+1}{x-4}$	$+$		0	$-$	$\vert$	$+$	

$\dfrac{x+1}{x-4} > 0$ iff $\boxed{x \in (-\infty,-1) \cup (4,\infty)}$

(9) $f(x) = x^2 - 2x + 5$

$g(x) = \dfrac{2x-5}{x+1}$

(a) Domain of f: $\boxed{x \in \mathbb{R}}$

Domain of g:

condition: $x+1 \neq 0$

$x \neq -1$

$\boxed{x \in \mathbb{R} \setminus \{-1\}}$

(b) $f(-x) = (-x)^2 - 2(-x) + 5$

$= x^2 + 2x + 5$

$f(a+h) = (a+h)^2 - 2(a+h) + 5$

$= a^2 + 2ah + h^2 - 2a - 2h + 5$

$g(2x) = \dfrac{2(2x) - 5}{2x+1} = \dfrac{4x-5}{2x+1}$

(10) $v(t) = -t^2 + 3t$

t = time (in sec)

v = velocity (ft/sec)

(a) v is a function of t because for every t, there is only one v

(b) t = independent

$v(t)$ = dependent

(c) $v(0) = -0^2 + 3(0)$

$v(0) = 0$ ft/sec

initial velocity

(d) $v(1) = -1^2 + 3(1)$

$v(1) = 2$ ft/sec

the velocity of the object after 1 second