Name: ______________________________

Math 32, Spring 2010, Section 101
Quiz 3

(1) Solve the inequality, and specify your answer in interval notation (1pt a, 2pts b/c)

(a) $3(t-2) \leq 4t+11$

This is equivalent to $3t-6 \leq 4t+11$, or $-17 \leq t$. In interval notation, $[-17, \infty)$.

(b) $\left|\dfrac{x+1}{2}\right| > 1$

We have two possibilities. One is $\frac{x+1}{2} > 1$, in which case the solutions are $x > 1$. On the other hand, we could have $\frac{x+1}{2} < -1$ in which case $x < -3$. Thus the answer is $(-\infty, -3) \cup (1, \infty)$.

(c) $\dfrac{x^2+2x-3}{x-2} \leq 0$

Factoring the top, we get $\frac{(x+3)(x-1)}{x-2} \leq 0$, so the key numbers are -3, 1, and 2. This inspires us to make the chart:

	$(-\infty, -3)$	$(-3, 1)$	$(1, 2)$	$(2, \infty)$
$x+3$	$-$	$+$	$+$	$+$
$x-1$	$-$	$-$	$+$	$+$
$x-2$	$-$	$-$	$-$	$+$
overall	$-$	$+$	$-$	$+$

So our answer is going to include the intervals $(-\infty, -3)$ and $(1, 2)$. Since the sign is "$\leq$" not "$<$", we include the endpoints *where they make sense.* In this case, -3 and -1 are valid solutions (try plugging them into the original inequality), but 2 is not because it would involve dividing by zero. Thus our solution is $(-\infty, -3] \cup [1, 2)$.

(2) (2 pts) Find the domain of the following function.

$$g(x) = \frac{\sqrt{x+6}}{x-2}$$

For this function to make sense, we need $x \neq 2$ and $x + 6 \geq 0$. That is, we need $x \geq -6$, but $x \neq 2$. In interval notation, that's $[-6, 2) \cup (2, \infty)$.

(3) (3 pts) Find the domain and range of the following function.

$$g(x) = \frac{4x - 20}{3x - 18}$$

The denominator cannot be 0, so we need $3x - 18 \neq 0$. That is, we need $x \neq 6$. So the domain is $(-\infty, 6) \cup (6, \infty)$.

To find the range, we set $y = \frac{4x-20}{3x-18}$ and solve for x. Multiplynig through by $3x - 18$ we get $3xy - 18y = 4x - 20$, or $3xy - 4x = 18y - 20$. Factoring out an x, that's $x(3y-4) = 18y - 20$, or $x = \frac{18y-20}{3y-4}$. The range of $g(x)$ is the domain of this new function, which is all numbers except when $3y - 4 = 0$. That is, all numbers besides $\frac{4}{3}$. In interval notation, $(-\infty, 4/3) \cup (4/3, \infty)$.