NAME __________________________

Quiz 2

1. Solve $x^2 - 5 = 0$ by using the zero product property.

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

2. Solve $x^2 + 5x = 3$ by completing the square.

Since $\frac{5x}{2x} = \frac{5}{2}$, we add the square of this to both sides,

$$x^2 + 5x + \frac{25}{4} = 3 \cdot \frac{4}{4} + \frac{25}{4} = \frac{37}{4}$$

Then, by the square of a sum formula

$$\left(x + \frac{5}{2}\right)^2 = \frac{37}{4}$$

Take the square root of both sides, and you get

$$x + \frac{5}{2} = \pm\frac{\sqrt{37}}{2}$$

Subtract $\frac{5}{2}$ from both sides and you're done:

$$\boxed{x = -\frac{5}{2} \pm \frac{\sqrt{37}}{2}}$$

3. (a) State the quadratic formula.

If $ax^2 + bx + c = 0$, then $\boxed{x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$

(b) Use the quadratic formula to solve $8x^2 - 5x - 1 = 0$.

Here $a = 8$, $b = -5$ and $c = -1$, so $\boxed{x = \frac{5 \pm \sqrt{5^2 - 4 \cdot 8 \cdot (-1)}}{2 \cdot 8} = \frac{5 \pm \sqrt{57}}{16}}$

4. Solve $x^{2/3} - x^{1/3} - 15 = 0$ by u-substitution.

Let $u = x^{1/3}$. Then the equation becomes

$$u^2 - u - 15 = 0$$

This won't factor nicely, so just use the quadratic formula to get u:

$$u = \frac{1 \pm \sqrt{1^2 - 4 \cdot 1 \cdot (-15)}}{2 \cdot 1} = \frac{1 \pm \sqrt{61}}{2}$$

But $u = x^{1/3}$, so to get x, cube both sides to get

$$\boxed{x = \left(\frac{1 \pm \sqrt{61}}{2} \right)^3}$$

5. Solve $3|5 - 7d| + 7 \geq 4$.

First, subtract 7 from both sides,

$$3|5 - 7d| \geq -3$$

then divide by 3,

$$|5 - 7d| \geq -1$$

Now that all numbers are on the other side of the inequality, we apply the definition of absolute value, which means we consider two cases:

(a) Case 1: $5 - 7d \geq -1$. In this case, subtract 5 from both sides,

$$-7d \geq -6$$

and divide by -7:

$$d \leq \frac{6}{7}$$

(b) Case 2: $-(5 - 7d) \geq -1$. In this case, multiply both sides by -1 to get rid of the negative:

$$5 - 7d \leq 1$$

Subtract 5:

$$-7d \leq -4$$

and divide by -7:

$$d \geq \frac{4}{7}$$

Putting all this together gives the solution set as

$$\boxed{\left\{ d \mid \frac{4}{7} \leq d \leq \frac{6}{7} \right\} \qquad \text{or in interval notation} \qquad \left[\frac{4}{7}, \frac{6}{7} \right]}$$