Quiz # 1

Directions: Carefully read each question below and answer to the best of your ability in the space provided. You **MUST** show your work to receive full credit!

1. (5 points) Solve the following quadratic equation:

$$x^2 + 5x + 6 = 0.$$

Solution: Notice that coefficients a, b and c are

$$a = 1 \quad b = 5 \quad \text{and} \quad c = 6.$$

Thus using quadratic formula, we obtain

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-5 \pm \sqrt{5^2 - 4 \cdot 1 \cdot 6}}{2 \cdot 1} = \frac{-5 \pm \sqrt{25 - 24}}{2} = \frac{-5 \pm 1}{2},$$
$$x_1 = \frac{-5+1}{2} = -2 \quad \text{and} \quad x_2 = \frac{-5-1}{2} = -3.$$

2. (5 points) Does multiplying both sides of an equation by $(x - 1)$ always produce an equivalent equation? Explain why or why not.

Solution: The answer is **NO**. Consider the equation $x = 0$. If we multiply both sides by $(x - 1)$, then we get $x(x - 1) = 0(x - 1) = 0$ since multiplying anything by zero give you zero. But according to zero product property, solutions to the new equation $x(x - 1) = 0$ are $x = 0$ and $x - 1 = 0$, which are $x = 0$ and $x = 1$, but $x = 1$ is not the solution to our original equation $x = 0$ since $1 \neq 0$.

3. (5 points) Find all the solutions to the following equation:

$$\sqrt{1 - t} = t + 5.$$

Solution: We are going to square both sides of the above equation, and at the end check for any extraneous solutions. So

$$\begin{aligned}
\sqrt{1-t} &= t+5 \\
(\sqrt{1-t})^2 &= (t+5)^2 \\
1-t &= t^2+10t+25 \\
0 &= t^2+11t+24 \\
t &= \frac{-11 \pm \sqrt{11^2-4\cdot 1\cdot 24}}{2\cdot 1} = \frac{-11\pm\sqrt{25}}{2} = \frac{-11\pm 5}{2} \\
t=-3 \quad &\text{or} \quad t=-8
\end{aligned}$$

So we got two solutions but we know that some of them might not be an actual solution to the original equation. So let's check:

$$\begin{array}{cc}
t=-3: & t=-8: \\
\sqrt{1-(-3)} = -3+5 & \sqrt{1-(-8)} = -8+5 \\
\sqrt{4} = 2 & \sqrt{9} = -3 \\
2 = 2\,\checkmark & 3 \neq -3.
\end{array}$$

Thus, the only solution is $t=-3$.

Name: ____

Question:	1	2	3	Total
Points:	5	5	5	15
Score:				