1. Solve the following linear equation for x, and write your solution(s) **using set notation**.

$$2x + 6(x - 4) = 5x + 6$$

2. Solve the following rational equation for x, and write your solution(s) **using set notation**.

$$\frac{1}{x+3} + \frac{2}{x} = \frac{12}{x^2 + 3x}$$

3. Solve the following formula for the variable y:

$$z = \frac{3x}{y} + 7$$

4. You would like to invest $\$5,000$. You plan to split the money up, and put it in two different bank accounts: one which gains 3% interest per year, and one which gains 5% interest per year. If you want to make \$175 in interest over the next year, how much do you need to put into each account?

5. Solve the following quadratic equation (using any method you like), and write your solution(s) **using set notation**. Write exact answers only (no decimal approximations).

$$2(x-2)^2 - 8 = 18$$

6. Answer the following questions using the course syllabus.

(*a*) Exam 1 covers sections _____.
(*b*) If you are sick, will you be able to make up a quiz? _____
(*c*) The date of the final exam will be _____.

Solutions

1.

$$\begin{aligned} 2x + 6(x-4) &= 5x + 6 \\ 2x + 6x - 24 &= 5x + 6 \\ 8x - 24 &= 5x + 6 \\ 8x - 5x &= 6 + 24 \\ 3x &= 30 \\ x &= 10 \end{aligned}$$

The solution set is then $\{10\}$, the set containing just the number 10.

2.

$$\begin{aligned} \frac{1}{x+3} + \frac{2}{x} &= \frac{12}{x^2+3x} \\ \frac{1}{x+3} + \frac{2}{x} &= \frac{12}{x(x+3)} \\ x + 2(x+3) &= 12 && \text{(mult. by } x(x+3)\text{)} \\ x + 2x + 6 &= 12 \\ 3x + 6 &= 12 \\ 3x &= 6 \\ x &= 2 \end{aligned}$$

This is fine, since the restrictions are just that x cannot be 0 or -3, so the solution set is $\{2\}$.

3.

$$\begin{aligned} z &= \frac{3x}{y} + 7 \\ zy &= 3x + 7y && \text{(mult. by } y\text{)} \\ zy - 7y &= 3x \\ (z-7)y &= 3x && \text{(factor out } y\text{)} \\ y &= \frac{3x}{z-7} \end{aligned}$$

4. Let's let x be the amount of money in the account with 3% interest. Since we have \$5000 total, $5000 - x$ will be the amount in the account with 5% interest. Since we want to make \$175 in interest between the two accounts, our equation to solve is:

$$\begin{aligned}
\text{“interest from account 1”} + \text{“interest from account 2”} &= 175 \\
0.03x + 0.05(5000 - x) &= 175 \\
0.03x + 0.05(5000) - 0.05x &= 175 \\
0.03x - 0.05x + 250 &= 175 \\
-0.02x &= -75 \\
x &= 3750
\end{aligned}$$

So $x = \$3750$ is the amount to put in the account with 3% interest, and $\$5000 - x = \$1250$ is the amount to put in the account with 5% interest, in order to gain a total of \$175 between the two accounts.

5. The way this problem is set up makes it easier to solve with the **square root method**.

$$\begin{aligned}
2(x-2)^2 - 8 &= 18 \\
2(x-2)^2 &= 26 && \text{(add 8)} \\
(x-2)^2 &= 13 && \text{(divide by 2)} \\
x - 2 &= \pm\sqrt{13} && \text{(take square root)} \\
x &= 2 \pm \sqrt{13}
\end{aligned}$$