QUIZ 24 SOLUTIONS: LESSONS 30-31
APRIL 10, 2019

Write legibly, clearly indicate the question you are answering, and put a box or circle around your final answer. If you do not clearly indicate the question numbers, I will take off points. Write as much work as you need to demonstrate to me that you understand the concepts involved. If you have any questions, raise your hand and I will come over to you.

Use any method you wish, **but if you do not show work, you will receive no points.**

1. [5 pts] Which of the following is a solution to

$$\begin{cases} x & + & 2y & + & z & = & 2 \\ x & - & y & & & = & 3 \\ x & + & 3y & + & z & = & 2 \end{cases} ?$$

(a) $(-3, -6, 17)$ **(d)** $(1, 0, -1)$
(b) $(-3, 0, 5)$ **(e)** $(1, 0, 1)$
(c) $(-1, -2, 7)$ **(f)** $(3, 0, -1)$

We note that $x = y + 3$ which means that the x value in the solution must be 3 larger than the y-value. This eliminates everything except (a) and (f).

Now, we check which answer is a solution to the system by checking the third equation:
$$x + 3y + z = 2.$$

(a): $-3 + 3(-6) + 17 = -3 - 18 + 17 = -4 \neq 2$
(b): $3 + 3(0) + (-1) = 2$

Since (a) does not satisfy the third equation, our answer must be $\boxed{(f)}$.

2. [5 pts] Which of the following is a solution to

$$\begin{cases} -x & + & y & + & z & = & 3 \\ -x & & & + & z & = & 0 \\ 4x & - & y & - & 3z & = & -1 \end{cases} ?$$

(a) $(-4, 3, 2)$ **(d)** $(8, 0, 11)$

(b) $(2, 3, 2)$ **(e)** $(14, -3, 20)$

(c) $(4, 3, 2)$ **(f)** $(20, 3, 20)$

By the second equation, we see that $x = z$. This eliminates all the options but (b) and (f). By the first equation, we see that $y = 3$ but this doesn't give us more information than we already have.

Moving on to the third equation, we see that

$$
\begin{aligned}
4x - y - 3z &= -1 \\
\Rightarrow \quad 4x - 3 - 3z &= -1 \\
\Rightarrow \quad 4x - 3 - 3x &= -1 \\
\Rightarrow \quad x - 3 &= -1 \\
\Rightarrow \quad x &= 2
\end{aligned}
$$

This implies, $z = x = 2$. We conclude $\boxed{\text{(b)}}$.