Solve each system of equations completely. (Show at least enough work that I can tell which method you're using.)
$1\left\{\begin{aligned} 2 x+y & =1 \\ 4 x+2 y & =3\end{aligned}\right.$
I'll solve this one by elimination; I multiply the first equation by -2 and then add them both together:

$$
\begin{aligned}
-4 x-2 y & =-2, \\
+\quad 4 x+2 y & =3 ; \\
\hline 0 & =1
\end{aligned}
$$

This statement is false, so there is no solution.
$2\left\{\begin{aligned} x-2 y+3 z & =7 \\ 2 x+y+z & =4 \\ -3 x+2 y-2 z & =-10\end{aligned}\right.$
I'll solve this one by substitution, first solving the first equation for $x$ :

$$
\begin{aligned}
x-2 y+3 z & =7 \\
x & =2 y-3 z+7 .
\end{aligned}
$$

This gives me a new system in 2 dimensions:

$$
\left\{\begin{aligned}
2(2 y-3 z+7)+y+z & =4 \\
-3(2 y-3 z+7)+2 y-2 z & =-10
\end{aligned}\right\} \begin{aligned}
5 y-5 z & =-10 \\
-4 y+7 z & =11 .
\end{aligned}
$$

I'll also solve this by substitution, solving the first equation for $y$ :

$$
\begin{aligned}
5 y-5 z & =-10 \\
y & =z-2
\end{aligned}
$$

Now I can solve for $z$ :

$$
\begin{aligned}
-4(z-2)+7 z & =11 \\
z & =1
\end{aligned}
$$

This gives me the other results:

$$
\begin{gathered}
y=(1)-2=-1 \\
x=2(-1)-3(1)+7=2 .
\end{gathered}
$$

Therefore,

$$
(x, y, z)=(2,-1,1)
$$

