1 *Consider the line with equation*

$$2x + y = 2.$$

a *What is the slope of this line? (Show what equation you solve or what numerical calculation you make.)*

I solve the equation for y:

$$\begin{aligned} 2x + y &= 2; \\ y &= -2x + 2. \end{aligned}$$

Since the coefficient on x is -2, the slope of the line is also

$$-2.$$

b *Find an equation for a line that passes through $(-3, 0)$ and is perpendicular to the line above. (Show what equations you solve or what numerical calculations you make to find the constants in this equation.)*

Since the slope of the original line is -2, the slope of the perpendicular line is $-\frac{1}{-2} = 1/2$. This line goes through $(-3, 0)$, so its equation is

$$\begin{aligned} y &= \frac{1}{2}\big[x - (-3)\big] + 0; \\ y &= \frac{1}{2}x + \frac{3}{2}. \end{aligned}$$

2 *Solve each system of equations completely. (Show at least enough work that I can tell which method you're using.)*

a $\begin{cases} x + y = 8 \\ x - y = 4 \end{cases}$

I'll solve this one by elimination; simply add these equations together, then solve for x:

$$\begin{aligned} x + y &= 8, \\ {}^{+}\underline{x - y &= 4;} \\ 2x \qquad &= 12; \\ x \qquad &= 6. \end{aligned}$$

Then substitute this into either of the original equations:

$$\begin{aligned} (6) + y &= 8; \\ y &= 2. \end{aligned}$$

Therefore,

$$(x, y) = (6, 2).$$

b $\begin{cases} x - y - z = 1 \\ 2x + 3y + z = 2 \\ 3x + 2y = 0 \end{cases}$

I'll solve this one by elimination too; I multiply the last equation by -1 and then add them all together:

$$\begin{aligned} x - y - z &= 1, \\ 2x + 3y + z &= 2, \\ {}^{+}\underline{-3x - 2y &= 0;} \\ 0 &= 3. \end{aligned}$$

This statement is false, so there is **no solution**.