1 *Consider the graph of the equation*

$$x^2 + y - 9 = 0$$

and answer the following questions about it. (Either show what equations you use to answer these questions or draw a graph in which the answers can clearly be seen.)

a *Is the graph symmetric with respect to the x-axis?*

I change y to $-y$, simplify, and compare with the original:

$$\begin{aligned} x^2 + (-y) - 9 &= 0; \\ x^2 - y - 9 &= 0. \end{aligned}$$

This is different from the original, so the graph is **not symmetric** with respect to the x-axis.

b *Is the graph symmetric with respect to the y-axis?*

This time I change x to $-x$:

$$\begin{aligned} (-x)^2 + y - 9 &= 0; \\ x^2 + y - 9 &= 0. \end{aligned}$$

This is the same as the original, so the graph is **symmetric** with respect to the y-axis.

c *Is the graph symmetric with respect to the origin?*

This time I change both:

$$\begin{aligned} (-x)^2 + (-y) - 9 &= 0; \\ x^2 - y - 9 &= 0. \end{aligned}$$

This is the different from the original, so the graph is **not symmetric** with respect to the origin.

2 *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

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