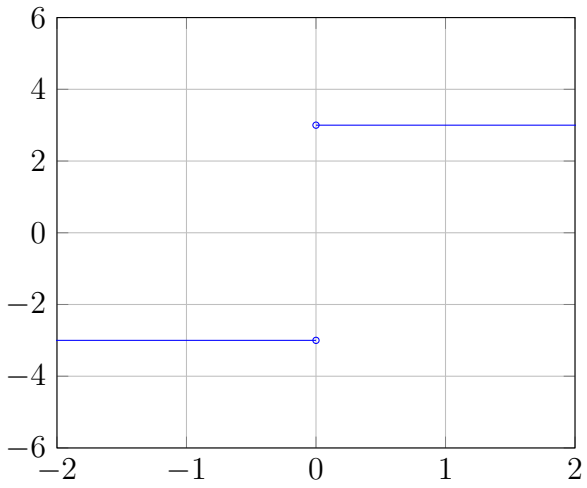
Quiz 3 solutions

Let $f(x) = |3x|$ and set $x = 0$. Draw the graph of the difference quotient for f at x, as a function of h.

(This means the horizontal axis is labeled by h, while the vertical axis will correspond to the value of the difference quotient.)



Our work is as follows:

$$\begin{aligned}\frac{f(x+h)-f(x)}{h} &= \frac{3|x+h|-3|x|}{h} \\ &= \frac{3|0+h|-3|0|}{h} \\ &= \frac{3|h|}{h} \\ &= \begin{cases} 3 & h>0 \\ -3 & h<0 \end{cases}. \end{aligned} \tag{2.1}$$

So we are to graph a function that is equal to 3 when h is positive, while equal to -3 when h is negative—hence we end up with the graph above.