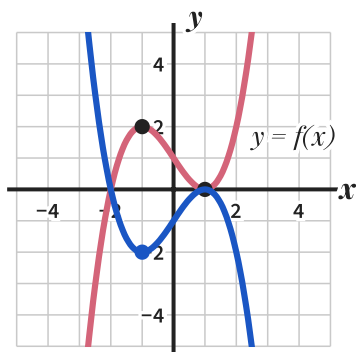


1



$y = f(x)$ has turning points $(-1, 2)$ and $(1, 0)$. Sketch $y = f(-x) - 2$ and give its turning points.

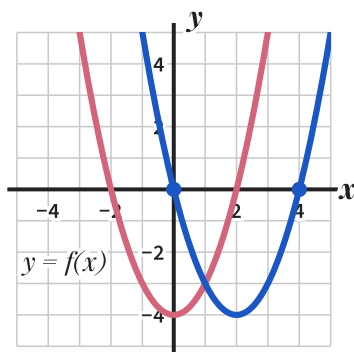


Answer $(1, 0)$ and $(-1, -2)$

2



The graph of $y = f(x) = x^2 - 4$ is shown. Sketch $y = f(x - 2)$ and find where it crosses the axes.



Answer $(0, 0)$ and $(4, 0)$

3



Describe fully the transformation that maps the graph of $y = x^2$ onto the graph of $y = x^2 + 4x + 9$.

$$y = (x + 2)^2 + 5$$

turning point $(0, 0) \rightarrow (-2, 5)$

Answer Translation by $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$

4



A fountain's jet is $h = f(d)$: h m high, d m across. Its highest point is $(2, 3)$. The fountain is moved 1.5 m left and 0.5 m up. Write the new equation and highest point.

left 1.5: inside the bracket, + 1.5

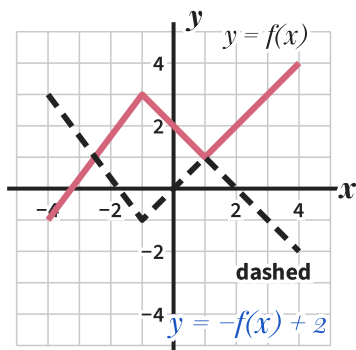
up 0.5: outside the bracket, + 0.5

Answer $h = f(d + 1.5) + 0.5$; $(0.5, 3.5)$

5



The dashed graph is $y = f(x)$ reflected in the x axis and then translated. Write its equation.

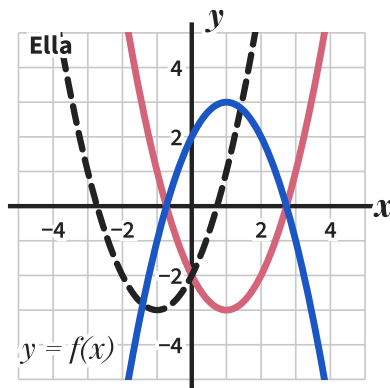


Answer $y = -f(x) + 2$

6



Ella's sketch of $y = -f(x)$ is dashed. Explain her mistake.



Reason She reflected in the y axis

7



The graph of $y = \cos x$ has a maximum point at $(0, 1)$. Write down the maximum point of $y = \cos(x - 90^\circ)$ for $0^\circ \leq x < 360^\circ$. Which graph is this?

$\cos$ moves 90° to the right

its peak at 90° matches $\sin$

Answer $(90^\circ, 1)$; $y = \sin x$

8



Ben says the graphs of $y = f(x) + 2$ and $y = f(x + 2)$ are never the same. Find a function $f(x)$ that shows he is wrong.

$x + 2$ and $(x + 2)$ are the same

the line moves up 2 and left 2 onto itself

Answer $f(x) = x$