3.1 answers

4. a) The graph can be obtained from the graph of $f(x) = x^2$ by applying a horizontal translation 7 units to the left, and a vertical translation 3 units down.
b) The graph can be obtained from the graph of $f(x) = x^2$ by applying a change in width about the x-axis by a factor of 2, a reflection in the x-axis, and a vertical translation 5 units up.
c) The graph can be obtained from the graph of $f(x) = x^2$ by applying a change in width about the x-axis by a factor of $\frac{1}{3}$, a reflection in the x-axis, and a horizontal translation 3 units to the right.
d) The graph can be obtained from the graph of $f(x) = x^2$ by applying a change in width about the x-axis by a factor of 4, a horizontal translation 2 units to the left, and a vertical translation 1 unit down.

5.

	a)	b)	c)	d)
Vertex	(5, 1)	(–2, 0)	(–4, –5)	(0, 3)
Axis of symmetry	$x = 5$	$x = -2$	$x = -4$	$x = 0$
Direction	upward	downward	upward	downward
Max/min	min $y = 1$	max $y = 0$	min $y = -5$	max $y = 3$
Domain	$x \in R$	$x \in R$	$x \in R$	$x \in R$
Range	$y \geq 1$	$y \leq 0$	$y \geq -5$	$y \leq 3$
Number of x-intercepts	0	1	2	2