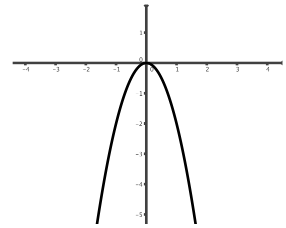
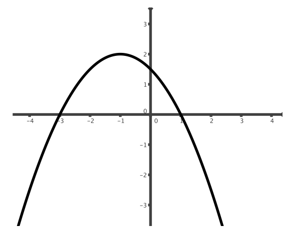
Section 9.5

9. The vertex of $y = (x+3)^2 - 4$ is at $(-3, 4)$.

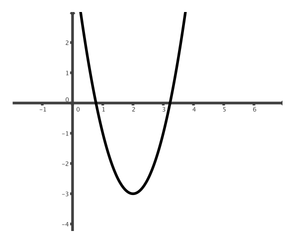
21. $y = -2x^2$



33. $f(x) = -\frac{1}{2}(x+1)^2 + 2$



35. $f(x) = 2(x-2)^2 - 3$



Section 9.6

5. $f(x) = x^2 + 8x + 10$ The vertex formula gives that the vertex is at $x = \frac{-b}{2a} = -4$ and $y = f(-4) = -6$. This thing opens upward (like the letter U).

25. $f(x) = -2x^2 + 4x - 5$. The vertex formula gives that the vertex is at $x = \frac{-b}{2a} = 1$ and $y = f(1) = -3$. This basically means that you can rewrite $f(x)$ as $f(x) = -2(x-1)^2 - 3$.

29. $x = -\frac{1}{5}y^2 + 16y + 11$ The vertex formula gives that the vertex is at $y = \frac{-b}{2a} = \frac{16}{2/5} = 40$ and $x = -\frac{1}{5}40^2 + 16(40) + 11 = 331$. This basically means that you can rewrite it as $x = -\frac{1}{5}(y-40)^2 + 331$. This is a parabola that opens to the left.

39. $s(t) = -16t^2 + 64t + 3$. Using the vertex formula tells us that the vertex is at the point $(2, 67)$. This basically means that the function is $s(t) = -16(t-2)^2 + 67$. Now since $(t-2)^2$ is always nonnegative, it follows that $-16(t-2)^2$ is always less than or equal to 0. So no matter what input you choose, there is no way the output can be bigger than 67. Therefore, the max height is when $t = 2$ and $s(t) = 67$ feet.

Section 10.1

7. Only the graph in A is one-to-one since it is the only one that passes the horizontal line test.

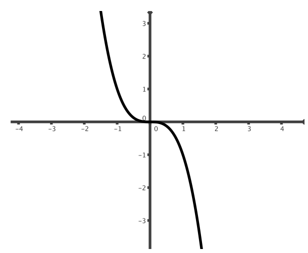
9. This function is one-to-one, and its inverse is $\{(6, 3), (10, 2), (12, 5)\}$.

15. If $g(x) = \sqrt{x-3}$, we think of this as $y = \sqrt{x-3}$. The inverse can be found by writing $x = \sqrt{y-3}$ and solving for y. This gives $y = x^2 + 3$. But the range of $g(x)$ is $[0, \infty)$, so the domain of $g^{-1}(x)$ is $[0, \infty)$.

21. **(a)** $f(3) = 2^3 = 8$ and **(b)** $f^{-1}(8) = 3$ because of the fact that $f(3) = 8$.

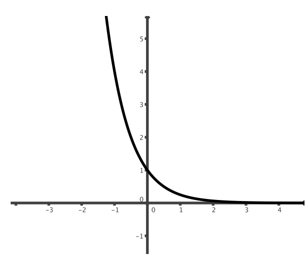
29. **(a)** It is a bit hard to tell for sure, but it appears that this function is one-to-one.

(b) The graph is shown to the right. This is the result of reflecting the graph (from the book) over the line $y = x$.



Section 10.2

9. $y = 4^{-x}$ is the same as $y = \left(\frac{1}{4}\right)^x$.



19. Rewrite $16^{2x+1} = 64^{x+3}$ as $16^{2x+1} = (16^{3/2})^{x+3} = 16^{(3/2)x+(9/2)}$, and thus we must solve $2x + 1 = (3/2)x + (9/2)$, and this gives $(1/2)x = 7/2$. Therefore, $x = 7$.

25. To solve $(3/2)^x = 8/27$, just note that $2^3 = 8$ and $3^3 = 27$. So the answer is $x = -1$.