1.3.1 The graphs are shown in the solutions section in the back of your text.
a) $f(x+2)$ represents a horizontal shift of $f(x)$ 2 units to the left.
b) $f(x-1)$ represents a horizontal shift of $f(x)$ 1 unit to the right.
c) $f(x)-4$ represents a vertical shift of $f(x)$ 4 units down.
c) $f(x+1)+3$ represents a horizontal shift of $f(x)$ 1 unit to the left, followed by a vertical shift of 3 units up.
e) $3f(x)$ represents a vertical stretching of $f(x)$.
f) $-f(x)+1$ represents a reflection of $f(x)$ across the x-axis, followed by a vertical shift of 1 unit up.

1.3.4 For $n(t) = m(t) + 2$, the graph of $n(t)$ looks like the graph of $m(t)$ shifted up 2 units vertically. The horizontal line at the leftmost section of the graph would be at $y = 1$. The next section would be a line passing through the point $(0, 3)$ and terminating at $(1, 4)$. The vertex of the "parabola" section would lie on the point $(2, 3)$. The last section would be a line beginning at $(3, 4)$ and crossing the x-axis at $(0, 7)$.

1.3.11 For $f(x) = 1/x, g(x) = 3x + 4$, we have $f(1) = 1, f(7) = 1/7, g(1) = 7$. So,
a) $f(g(1)) = f(7) = 1/7$,
b) $g(f(1)) = g(1) = 7$,
c) $f(g(x)) = f(3x + 4) = 1/(3x + 4)$,
d) $g(f(x)) = g(1/x) = 3\frac{1}{x} + 4 = \frac{3}{x} + 4$, and
e) $f(t)g(t) = \frac{1}{t}(3t + 4) = 3 + \frac{4}{t}$.

1.3.14 For $f(n) = 3n^2 - 2$ and $g(n) = n + 1$, find and simplify:
a) $f(n) + g(n) = (3n^2 - 2) + (n + 1) = 3n^2 - 2 + n + 1 = 3n^2 + n - 1$.
b) $f(n)g(n) = (3n^2 - 2)(n + 1) = 3n^3 + 3n^2 - 2n - 2$.
c) The domain of $f(n)/g(n)$ is $(-\infty, -1) \cup (-1, \infty)$, since the numerator, $f(x)$, is defined for all real numbers, and the denominator, $g(x)$, is defined for all real numbers and zero only at $n = -1$.
d) $f(g(n)) = f(n + 1) = 3(n + 1)^2 - 2 = 3(n^2 + 2n + 1) - 2 = 3n^2 + 6n + 3 - 2 = 3n^2 + 6n + 1$.
e) $g(f(n)) = g(3n^2 - 2) = (3n^2 - 2) + 1 = 3n^2 - 1$.

1.3.24 The graph does not pass the horizontal line test, therefore the function is not invertible.

1.3.25 The graph of this function is a parabola, and does not pass the horizontal line test. Therefore the function is not invertible.

1.3.33 For $f(x) = e^{x^2-1}$,

$$\begin{aligned} f(-x) &= e^{(-x)^2-1} \\ &= e^{(-1)^2x^2-1} \\ &= e^{x^2-1} \\ &= f(x). \end{aligned}$$

So $f(x)$ is even.

1.3.35 $f(x) = e^x - x$ is neither odd nor even.

1.3.41 Unless the plane stops using fuel, this function will be invertible.
1.3.42 Unless the customers coordinate their comings and goings, it is not likely that this function is invertible.
1.3.43 For a class of normal size, this function would not be invertible. You'd need at least 364 students for $f^{-1}(0)$ to be well defined, and you'd need a minimum of 66,430 students for this function to have a chance at being invertible.
1.3.44 Since the cost of mailing a letter is the same for different weights, this function is not invertible.

1.3.46 I estimate $f(2)$ to be approximately 1/3. I estimate $g(1/3)$ to be 1. So a good estimate for $g(f(2))$ would be $g(1/3) = 1$.

1.3.61 The cost of producing q is given by the function $C = f(q) = 100 + 2q$. **a)** Find a formula for the inverse function.

$$\begin{aligned} C &= 100 + 2q \\ C - 100 &= 2q \\ C/2 - 50 &= q \end{aligned}$$

So $f^{-1}(C) = C/2 - 50$.
b) Explain in practical terms what the inverse function tells you.
The inverse function would tell us how many articles we could produce if we spent C dollars.