Section 3.3 Decomposition of Functions

Problem 2.

(a) $f(x) = \sqrt{x}$ and $g(x) = x^2 + 3$.

(b) $f(x) = x + \frac{5}{x}$ and $g(x) = \sqrt{x}$.

Problem 6.
Put $f(x) = x^3$ and $g(x) = x^2 + 7x + 1$.

Section 3.4 Altered Functions, Altered Graphs

Problem 1.

(a) The zeros of $m(x)$ are $x = -4, -1, 2,$ and 8. $m(x) = 5f(x) = 0 \Leftrightarrow f(x) = 0$. Hence the zeros of $m(x)$ and $f(x)$ are the same.

(b) The zeros of $g(x)$ are $x = -6, -3, 0,$ and 6. Shifting f two units to the left shifts all zeros two units to the left: $g(x) = f(x+2) = 0 \Rightarrow x = a$ is a zero of g if and only if $x + 2 = a + 2$ is a zero of f.

(c) The zeros of $h(x)$ are $x = -2, -\frac{1}{2}, 1,$ and 4. If $h(x) = f(2x) = 0$, then $x = a$ is a zero of h if and only if $2x = 2a$ is a zero of f. Hence if $x = b$ is a zero of f, then $x = b/2$ is a zero of h.

(d) The zeros of $j(x)$ are $x = -3, 0, 3,$ and 9. Shifting f one unit to right shifts all zeros one unit to the right: $j(x) = f(x-1) = 0 \Rightarrow x = a$ is a zero of j if and only if [illegible] a zero of f.

Problem 6.

(a) (ii)

(b) (iv)

(c) (v)

(d) (vi)

Problem 13.

(a) Shift the graph of $y = x^2$ left 1 unit, then flip over the x−axis, then stretch by a factor of 2, then shift up 3 units.

(b) Shift the graph of $y = x^2$ left 1 unit, then stretch by a factor of 7, then shift down 7 units.

Section 4.1 Making Predictions

Problem 1.
Let $L(t)$ be the length of her work[illegible]ut, in pool lengths, after t days: $L(t) = 20 + 2(\frac{t}{4}) = 20 + \frac{1}{2}t$. This is not entirely accurate because she [illegible]dds 2 lengths after every 4 days; thus her workout is still 20 lengths at $t = 2$, for instance, but $L(2) = $ [illegible]1.