The Difference Quotient

In these exercises, we practice computing and simplifying an expression known as the *difference quotient*. At first, we will work with simpler building blocks to the difference quotient.

1. This exercise is just a warm-up. There is no difference quotient here. Let f be defined by $f(x) = 3x^2 + 2x - 4$.

   a) Find $f(0)$.

   b) Find $f(1)$.

   c) Simplify $f(-x)$.

   d) Simplify $-f(x)$.

   e) Simplify $f(x+1)$.

   f) Simplify $f(2x)$.

2. If $g(x) = x^2 + 3$, simplify $g(x+2) - g(x)$.

3. If $k(x) = \dfrac{3}{x}$, simplify $k(x+2) - k(x)$.

4. For each of these functions, find and simplify the *difference quotient*. For a function f, the difference quotient of f is $\frac{f(x+h)-f(x)}{h}$.

   a) $f(x)=4x+3$

   b) $g(x)=x^2-4$

   c) $h(x)=2x^2-3x+1$

   d) $k(x)=\frac{1}{x+3}$