

**Reading** Stewart §1.4 and §2.1.

**Note** If you are beginning this set before Wednesday's class, you should read the "limit definition of the derivative" in section 2.1 first.

1. Using the **limit definition of the derivative**:
  - a) Find the slope of the tangent line to the curve  $y = x^2 - 3x$  at the point where  $x = -1$ .
  - b) Find the equation of the tangent line from part (a). Simplify your answer.
2. Using the **limit definition of the derivative**, find and simplify the equations of:
  - a) the tangent line to the curve  $y = x^3 + 2x - 7$  at the point  $(2, 5)$ .
  - b) the tangent line to the curve  $y = \sqrt{x}$  at the point  $(1, 1)$ .
3. An ant is crawling along a wire with position  $s(t) = \frac{5}{t^2}$  centimeters down the wire at time  $t$  seconds after noon. Using the **limit definition of the derivative**, find its velocity:
  - a) at time  $t = 1$ ;
  - b) at time  $t = 2$ .
4. Suppose  $f(x)$  is a function with the property that  $f(2) = 6$  and  $f'(2) = -2$ . Find an equation for the tangent line to the curve  $y = f(x)$  at the point where  $x = 2$ . Simplify your answer.
5. Suppose  $g(x)$  is a function with the property that the tangent line to  $y = g(x)$  at the point  $(4, 1)$  passes through the point  $(6, -3)$ . Find  $g(4)$  and  $g'(4)$ .