

1. Find an equation for the tangent line to the curve  $y = 3x - x^2$  at the point  $(3, 0)$
2. Find an equation for the tangent line to the curve  $y = x^3$  at the point  $(1, 1)$
3. Find  $f'(a)$  for  $f(x) = \frac{1}{x^3}$
4. Find  $f'(a)$  for  $f(x) = \sqrt{3x + 2}$
5. The limit  $\lim_{x \rightarrow 1} \frac{\sqrt{3+x} - 2}{x - 1}$  represents the derivative of a function  $f$  at a number  $a$ . Find  $f$  and  $a$ .
6. The limit  $\lim_{h \rightarrow 0} \frac{\tan(4 + 2h) - \tan(4)}{h}$  represents the derivative of a function  $f$  at a number  $a$ . Find  $f$  and  $a$ .
7. Let  $f(x) = \begin{cases} 3 - x^2, & x < -1 \\ 2x + 1, & x \geq -1 \end{cases}$ . For which values of  $a$  does  $f'(a)$  exist?
8. A particle moves along a straight line with its position given by the function  $f(t) = 2t^2 - 3t$ . Find the velocity and speed with  $t = 2$ .
9. A particle moves along a straight line with its position given by the function  $f(t) = \frac{1}{t - 4}$ . Find the velocity and speed with  $t = 3$ .