

**Section 3.1: Additional Problems**

1. Use any method to find the derivative of  $g(x) = |2x + 5|$
2. At what point on the curve  $y = x\sqrt{x}$  is the tangent line parallel to the line  $3x - y + 6 = 0$ ?
3. At what point does the curve  $y = 3e^x - 5x$  have an instantaneous rate of change of 1?
4. Suppose the curve  $y = x^4 + ax^3 + bx^2 + cx + d$  has a tangent line when  $x = 0$  with equation  $y = 2x + 1$  and a tangent line when  $x = 1$  with equation  $y = 2 - 3x$ . Find the values of  $a$ ,  $b$ ,  $c$ , and  $d$ .
5. What is the value of  $c$  such that the line  $y = 2x + 3$  is tangent to the curve  $y = cx^2$ ?
6. Find values of  $m$  and  $b$  that make  $f(x)$  differentiable everywhere.  

$$f(x) = \begin{cases} x^2 & \text{if } x \leq 2 \\ mx + b & \text{if } x > 2 \end{cases}$$
7. compute  $y'$ .  $y = x^2(x^3 + 3x + 7)$
8. compute  $y'$ .  $y = (x^3 + 4x + 1)\sqrt{x}$
9. compute  $y'$ .  $y = \sqrt[5]{x^3} + \sqrt[3]{x^2} + 7^2$
10. compute  $y'$ .  $y = \frac{14}{\sqrt[7]{x^{10}}} + \pi^4 + x^{1.8}$
11. Find where the function  $f(x) = x^3 - 5x^2 + 6x - 30$  has an instantaneous rate of change of 6.
12. Find the values of  $x$  where the tangent line for the function  $y = (x^2 + 6)(x + 5)$  has a slope of 14
13. Find where the function  $f(x) = x^3 - 6x^2 - 56x + 25$  has an instantaneous rate of change of 40.
14. Find the value of  $B$  so that  $f(x) = x^3 + Bx^2 + 4$  will have instantaneous rate of change of 30 at  $x = 2$ .
15. Find the value of  $B$  so that  $f(x) = x^4 - 3Bx^2 + 7x + 2$  so that  $f'(3) = -29$ .
16. Find the value of  $x$  where the tangent line at  $x = 3$  to the function  $y = x^2 + 3$  will cross the x-axis.
17. Find the value of  $x$  where the tangent line at  $x = 4$  to the function  $y = x^2 + 2x + 1$  will cross the x-axis.