

3.1: Derivatives of Polynomials and Exponential Functions WRITTEN

**Do and show your work using the standard written style sheet format.
Work turned in on this page will not be checked.**

Check your tangent line on graphing calculator (you do not need to include the graphs in your written up homework). Display your answers in simplified forms, i.e.,

$$\boxed{f'(x) = \frac{1}{x^2} \text{ not } f'(x) = x^{-2}}$$

$$\boxed{f'(x) = \frac{2}{\sqrt{x}} \text{ not } f'(x) = 2x^{-\frac{1}{2}}}$$

1. Find $f'(x)$ for $f(x) = \frac{4}{5}\sqrt{18}$. (Hint: $\frac{4}{5}\sqrt{18}$ is a ..?)
2. Find $f'(x)$ and $f''(x)$ for $f(x) = \left(\frac{4}{5}x\right)^3$ (Hint: Simplify first!)
3. Find the equation for the tangent line to $f(x) = (x+2)(x-1)$ at $x = 3$ (Hint: Simplify first!)
4. Find $f'(x)$ and $f''(x)$ for $f(x) = \frac{2}{3}\sqrt{x}$ (Hint: $\sqrt{x} = x^{\frac{1}{2}}$)
5. Find the equation for the tangent line to $f(x) = \sqrt{x}(x^2 - 3)$ at $x = 4$ (Hint: Simplify first!)
6. Find the equation for the tangent line to $f(x) = \frac{x^3 - 3x^2}{x^2}$ at $x = 1$ (Hint: Simplify first!)
7. Find the equation for the tangent line to $f(x) = \frac{x^2 - 2x}{\sqrt{x}}$ at $x = 4$ (Hint: Simplify first!)
8. Find the equation for the tangent line to $f(x) = \frac{3}{x^5}$ at $x = 2$ (Hint: $\frac{3}{x^5} = 3x^{-5}$)
9. Find the equation for the tangent line to $f(x) = \sqrt[3]{x} + 2\sqrt{x^3}$ at $x = 4$
10. Find $f'(x)$ for $f(x) = 3^x$
11. Find $f'(x)$ and $f''(x)$ for $f(x) = e^x + 3x$
12. Compare the graphs of $f(x)$ and $f'(x)$ and use them to explain when $f(x)$ is increasing, decreasing, concave up, concave down or has an inflection point. Sketch both graphs.
 $f(x) = x^2 - 3x + 2$