

### 9.4 Practice

The following problems only require the most basic derivative rules (power, coefficient and sum/difference rules). The difficulty for students is the algebra require to get the initial problem expanded and in the form  $cx^b$ .

For each problems find the derivative.

1.  $y = 5x - 3x^2 + 1$

2.  $R(q) = -0.4q^3 + \frac{q^2}{2} + 4.5q$

3.  $y = \sqrt[3]{x} - 3x^4 + \frac{5}{\sqrt{x}}$

4.  $f(x) = x^3(x^5 + \frac{2}{x})$

5.  $g(x) = 12\sqrt{x} - \frac{10}{x^2} + 17$

6.  $y = \frac{x^{-2} + x^7 - 2}{\sqrt{x}}$

7.  $y = \sqrt{x}(x^3 + 4)$

8.  $y = \frac{x^3}{3} + \frac{5}{x^2} + 6\sqrt[3]{x^2}$

9.  $y = \frac{t^2 - \sqrt{t} + 2}{t^2}$

10.  $y = \frac{4\sqrt[3]{x^2}}{5\sqrt{x^3}}$

1.  $y = 5x - 3x^2 + 1 \Rightarrow y' = 5 - 6x$
2.  $R(q) = -0.4q^3 + \frac{q^2}{2} + 4.5q \Rightarrow R'(q) = -1.2q^2 + q + 4.5$
3.  $y = \sqrt[3]{x} - 3x^4 + \frac{5}{\sqrt{x}} \Rightarrow y = x^{1/3} - 3x^4 + 5x^{-1/2} \Rightarrow y' = \frac{1}{3}x^{-2/3} - 12x^3 - \frac{5}{2}x^{-3/2}$
4.  $f(x) = x^3(x^5 + \frac{7}{x}) \Rightarrow f(x) = x^8 + 7x^2 \Rightarrow f'(x) = 8x^7 + 14x$
5.  $g(x) = 12\sqrt{x} - \frac{10}{x^2} + 17 \Rightarrow g(x) = 12x^{1/2} - 10x^{-2} + 17 \Rightarrow g'(x) = 6x^{-1/2} + 20x^{-3}$
6.  $y = \frac{x^{-2} + x^7 - 2}{\sqrt{x}} \Rightarrow y = \frac{x^{-2}}{x^{1/2}} + \frac{x^7}{x^{1/2}} - \frac{2}{x^{1/2}} \Rightarrow y = x^{-2.5} + x^{6.5} - 2x^{-0.5}$   
 $\Rightarrow y' = -2.5x^{-3.5} + 6.5x^{5.5} + x^{-1.5}$
7.  $y = \sqrt{x}(x^3 + 4) \Rightarrow y = x^{1/2}(x^3 + 4) \Rightarrow y = x^{3.5} + 4x^{0.5} \Rightarrow y' = 3.5x^{2.5} + 2x^{-0.5}$
8.  $y = \frac{x^3}{3} + \frac{5}{x^2} + 6\sqrt[3]{x^2} \Rightarrow y = \frac{1}{3}x^3 + 5x^{-2} + 6x^{2/3} \Rightarrow y' = x^2 - 10x^{-3} + 4x^{-1/3}$
9.  $y = \frac{t^2 - \sqrt{t} + 2}{t^2} \Rightarrow y = \frac{t^2}{t^2} - \frac{t^{1/2}}{t^2} + \frac{2}{t^2} \Rightarrow y = 1 - t^{-1.5} + 2t^{-2}$   
 $\Rightarrow y' = 1.5t^{-2.5} - 4t^{-3}$ .
10.  $y = \frac{4\sqrt[3]{x^2}}{5\sqrt{x^3}} \Rightarrow y = \frac{4x^{2/3}}{5x^{3/2}} \Rightarrow y = \frac{4}{5}x^{-5/6} \Rightarrow y' = -\frac{4}{5} \cdot \frac{5}{6}x^{-11/6} = -\frac{2}{3}x^{-11/6}$