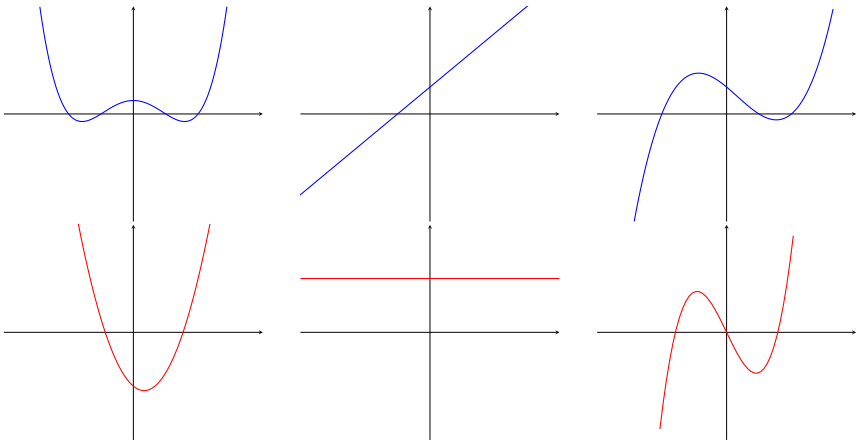

Figure 5: Exercise 5.4

5 Math101 exercises

5.1 Differentiate the functions:

$$f_1(x) = 2x + 1, \quad f_2(x) = x + \cos(x), \quad f_3(x) = e^x - 1, \quad f_4(x) = \frac{1}{4}x^2 + \ln(x).$$

5.2 Determine the slope of the function $f(x) = x^3 + x^2 - x$ at $x = 0$ and $x = 1$.

5.3 Use the rule $\frac{d}{dx}x^n = nx^{n-1}$ to differentiate the functions:

$$f_1(x) = x^3, \quad f_2(x) = \sqrt{x}, \quad f_3(x) = \frac{1}{x}, \quad f_4(x) = \frac{1}{x^2}, \quad f_5(x) = \frac{1}{\sqrt{x}}.$$

5.4 Determine for each of the blue graphs in Figure 5 which of the red graphs corresponds to its derivative.

5.5 Differentiate the functions:

$$f(x) = 3e^{2x} - \frac{1}{2}\ln x, \quad g(x) = \frac{1}{2}\sin x, \quad h(x) = \ln(\frac{x}{2}) + 3e^{-\frac{1}{6}x}.$$

5.6 Differentiate the functions:

$$f(x) = x^7 - 2x^4 - 3x^2, \quad g(x) = -x^5 + 4x^{\frac{3}{2}} - x^{-2}, \quad h(x) = \sqrt{x} + \frac{2}{x}.$$

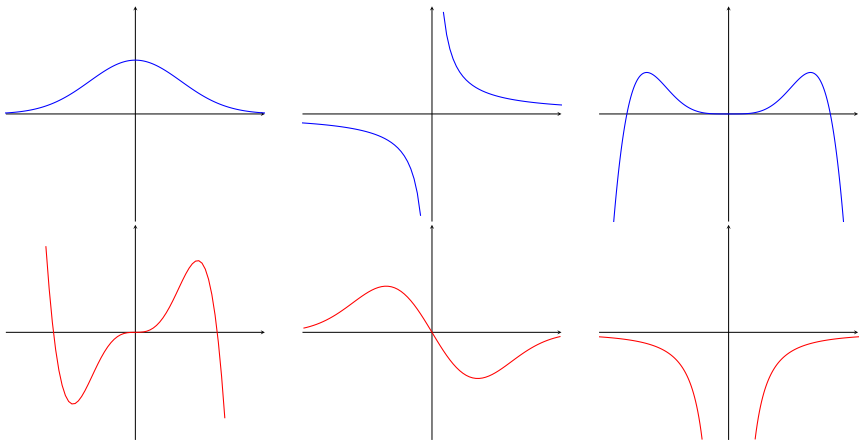

Figure 6: Exercise 5.10

5.7 For which values of x does the following functions have slope equal to 2.

$$f(x) = x^3 + 2x, \qquad f(x) = \frac{1}{3}x^3 - 3x^2 + 2x - 1.$$

5.8 Differentiate the functions:

$$f(x) = 3\sqrt[3]{x}, \qquad f(x) = (3x + 4)x^2.$$

5.9 Differentiate the functions:

$$f(x) = \frac{\sqrt{x} + 1}{x}, \qquad f(x) = \frac{x^2\sqrt{x^3}}{x^{-1/4}}, \qquad f(x) = \ln \frac{1}{x^2}$$

5.10 Determine for each of the blue graphs in Figure 6 which of the red graphs corresponds to its derivative.

5.11 Differentiate the functions:

$$f(x) = -\ln(\frac{1}{x^{-5}}), \qquad f(x) = \sqrt[3]{e^{9x}}.$$