1. [9 *points*]

Use the definition of $\frac{dy}{dx}$ to show that:

(a) If $y = 2x^2 + x$, then $\frac{dy}{dx} = 4x + 1$. [3]

(b) If $y = \frac{3}{x}$, then $\frac{dy}{dx} = -\frac{3}{x^2}$. [3]

(c) If $y = 4\sqrt{x}$, then $\frac{dy}{dx} = \frac{2}{\sqrt{x}}$. [3]

2. [11 *points*]

Find the gradient function y' of the following functions. Simplify your answers.

(a) $y = \dfrac{2}{x^2} + 3x - 1$ [2]

(b) $y = x^5 \sin(2x) \cos(3x)$ [3]

(c) $y = \sqrt{e^{2x} + \sin^2 x}$ [3]

(d) $y = \dfrac{x^3 - \pi \ln 2}{x^2 + e}$ [3]