MA1M01 Calculus Assignment 3
Michælmas term week 5

1. [**40 points**] Find the following indefinite integrals:

   (a) $\int 5x^6 dx$

   (b) $\int \frac{4x^5 - 3x}{7} dx$

   (c) $\int 3x^7 + 7x^2 + 4x + 3 dx$

   (d) $\int x^{\frac{2}{3}} dx$

   (e) $\int 3x^{-5} dx$

   (f) $\int \frac{-3x^{\frac{2}{3}} + 7x^{-2}}{8} dx$

2. [**40 points**] Find the following definite integrals:

   (a) $\int_{-a}^{a} x dx$

   (b) $\int_{-1}^{1} x^2 + 4x - 3 dx$

   (c) $\int_{-4}^{-1} \frac{1}{x^3} dx$

   (d) $\int_{-1}^{1} x^7 + \frac{2}{3} x dx$

   (e) $\int_{0}^{4} x^{\frac{-1}{5}} dx$

   (f) $\int_{-2}^{3} \frac{4(x+1)^2 + x^7}{2} dx$

3. [**5 points**] Compute the average rate of change of $f(x) = \frac{1}{3}x^3 + 7$ as x varies from -3 to 3.

4. [**5 points**] What is the rate of change of $f(x) = -x^{\frac{3}{2}} + 4x$ at $x = 16$.

5. [**10 points**] Find the average value of each of the following functions as x varies from -3 to 1:

   (a) $f(x) = x^3 + 2$

   (b) $f(x) = 3x^3 + 7x^2 + 1$

Homework is due one week from when it is given in the tutorial you are assigned to.
This set should be handed up in week 6.