Assignment 1

Due date: January 16, 2016

Total marks: 100

All assignments must be submitted ONLINE, in ONE single pdf file following the procedure explained in UM Learn. If you have trouble submitting them the right way, please contact the DE technical support.

Your assignment will not be graded if you fail to submit it ONLINE, in ONE single file.

This assignment is based on units 1 and 2. SHOW ALL WORK to get full marks. Leave answers as exact answers. For example, leave it as $1/7$ as opposed to 0.142857.

1.(28 points)

Use the form of the integral given in Theorem 4 section 5.2 to evaluate

$$\int_1^3 (6x^2 + 2x + 4)\, dx.$$

Do not use the Fundamental Theorem of Calculus, only for this question.

2.(10 points)

Let

$$f(x) = \begin{cases} 4 & \text{for} & -2 \le x \le 2 \\ 6 - x & \text{for} & 2 < x < 6 \\ 2x - 12 & \text{for} & 6 \le x \le 8. \end{cases}$$

Sketch the graph of f on the interval $[-2, 8]$ and evaluate $\displaystyle\int_{-2}^8 f(x)\, dx$.

3.(16 points)

Find the derivative $\dfrac{d}{dx} \displaystyle\int_{\ln x}^{\sqrt{x}} (t^5 + 3t^3 - 1)^{3/2}\, dt$, using the Fundamental Theorem of Calculus, Part 1.

4.

Evaluate

(a) (14 points) $\displaystyle\int \frac{3x + 4}{2x + 7}\, dx$

(b) (8 points) $\displaystyle\int \frac{dx}{\sqrt{x}(\sqrt{x} + 1)^2}$

(c) (12 points) $\displaystyle\int_1^3 x \sin(\pi x^2)\, dx$

(d) (12 points) $\displaystyle\int_1^4 \frac{x - 1}{\sqrt{x}}\, dx.$