

MATH 1700 D01 Summer 2015 Assignment 2

SHOW ALL WORK to get full marks. Leave answers as exact answers. For example, leave it as e^2 as opposed to a decimal approximation. Simplify as much as possible unless told otherwise.

1. Evaluate the following indefinite integrals

(a)

$$\int \left(\frac{y^4 + 3y + 5\sqrt[3]{y}}{y^2} \right) dy$$

(b)

$$\int (10 - 2t)^{2015} dt$$

(c)

$$\int \sec^2 u \sin(\tan u) du$$

2. Evaluate the following definite integrals

(a)

$$\int_0^{\ln 2} \frac{e^{2x}}{(e^{2x} + 1)^3} dx$$

(b)

$$\int_1^2 \frac{\sec^{-1} x}{x\sqrt{x^2 - 1}} dx$$

(c)

$$\int_e^{e^9} \frac{1}{t\sqrt{\ln t}} dt$$

(d)

$$\int_{-5}^5 \frac{(4u^4 + u^2) \sin u}{u^6 + u^2 + 1} du$$

3. Evaluate the following integral by interpreting it in terms of areas

$$\int_{-3}^3 (2 + \sqrt{9 - x^2}) dx$$

(The question did not say using the definition of area)

4. Draw a sketch of the region R and then calculate the area of R where R is the region bounded by the curves $y = x^2$, $y = 3x^2$ and $2x + y = 8$ where $x \geq 0$.

5. Draw a sketch of the region R and then calculate the volume of revolution of R where R is the region bounded by $y = 6x - x^2$, $y = 5$ rotated about
- (a) $y = 2$.
 - (b) $x = 5$.

6. A cup of coffee has temperature 75° and takes an hour to cool to approximately 28.3° in a room of temperature of temperature 20° . It can be shown that the temperature follows the function

$$T(t) = 20 + 50e^{-kt}$$

where $k = 0.03$ and t is in minutes. Calculate the average temperature of the coffee over the first hour.