

MATH 1700 D01 Winter 2013 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.

1. Find the following indefinite integrals

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

(b)
$$\int (10 - 3t)^{2013} dt$$

(c)
$$\int \sin u \sin(\cos u) du$$

2. Find the following definite integrals

(a)
$$\int_0^{\ln 4} \frac{e^x}{(e^x + 1)^3} dx$$

(b)
$$\int_1^{\sqrt{3}} \frac{\tan^{-1} x}{1 + x^2} dx$$

(c)
$$\int_e^{e^3} \frac{1}{t \ln^3 t} dt$$

(d)
$$\int_{-5}^5 \frac{(4u^3 + u) \cos u}{u^6 + u^2 + 1} du$$

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

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

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

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

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. Find the average temperature of the coffee over the first hour.