

MAT 1322 – Assignment 1 (due on 19th of MAY, 19:00pm)

NO late assignments!!!

Name (please print):

**1.** (i) Use the Comparison Test to determine if the integral converges or diverges. Justify your answer in a clear manner.

$$\int_1^{\infty} \frac{5 - \cos(x)}{2011 + x^{2010}} dx$$

(ii) Determine if the integral is convergent or divergent. If it is convergent, evaluate the integral.

$$\int_0^1 \frac{4}{4y - 1} dy.$$

**Solution:**

**2.** Let  $S$  be the solid obtained when the region  $R$  in the  $xy$ -plane bounded by the curve  $y = e^x$  and the lines  $y = x$ ,  $x = 0$  and  $x = 1$  is rotated around the line  $y = -1$ .

(a) Sketch the region in the  $xy$ -plane and a typical cross-section of the solid, showing the dimensions.

(b) Calculate the volume of  $S$ .

**Solution:**

**3.** By using the method of cylindrical shells find the volume of the solid obtained by rotating about  $x = 1$  the region bounded by the curves  $y = x^2$ ,  $y = -x^2 + 2$ . Your solution must include a sketch of the region, of a typical shell, and the volume of that shell.

**Solution:**

4. Consider the arc  $x = e^{-t} + e^t$ ,  $y = -2t + 5$ ,  $0 \leq t \leq 3$ . Calculate its exact length.

**Solution:**