

University of Toronto  
Faculty of Engineering  
**MAT 187H1S TERM TEST**  
**TUESDAY, MARCH 5, 2002, 11:10 AM**  
Duration: 50 minutes

**Aids Allowed:** Casio 260, Sharp 520 or Texas Instrument 30 calculator.

**Instructions:** Fill in the information on this page, and make sure this test contains 4 pages. Present your **solutions** in the space provided. Use the back of the preceding page if you need more space. The value for each question is indicated in square brackets beside each question number.

**TOTAL MARKS: 40**

**NAME:** \_\_\_\_\_

**STUDENT NUMBER:** \_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_

**TUTORIAL: (eg Tut0107)** \_\_\_\_\_

**TUTOR:** \_\_\_\_\_

**MARKER'S REPORT:**

QUESTIONS	MARKS
Question 1	
Question 2	
Question 3	
TOTAL	

1. [13 marks] Find  $\int \frac{2-x}{x^4+x^2} dx$

2. [12 marks] Plot the two curves with polar equations

$$r = 4 + 2 \sin \theta \text{ and } r = 3$$

and find the area inside  $r = 4 + 2 \sin \theta$  but outside  $r = 3$ .

3. [15 marks] Find the following:

(a) [8 marks]  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at the point  $(x, y) = (0, 0)$  if

$$x = t^2 + t \text{ and } y = t^3 - 3t.$$

(b) [7 marks]  $\frac{d\mathbf{u}}{dt} \times \mathbf{v} + \int \mathbf{v} dt$ , if  $\mathbf{u} = t\mathbf{i} + e^t\mathbf{j} + 4\mathbf{k}$  and  $\mathbf{v} = \cos t\mathbf{i} + \sin t\mathbf{j} + 2t\mathbf{k}$ .