

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

TEST 2**MATHEMATICS 1001****November 20, 2002**

Marks

NAME:

Lab Section:

Problem 1 (5 points)

Show that the following formula is true

Hint: you may either do it by taking derivative of the right hand side or evaluate the integral in the left hand side of the formula.

$$\int \sqrt{1-x^2} dx = \frac{1}{2}(\arcsin x + x\sqrt{1-x^2})$$

Problem 2 (20 points)

Consider the following region bounded by three curves given by their equations: $x^2 + y^2 = 1$, $y = 0$ and $y - x = 0$.

a) Find coordinates of the point of intersection A, B, C

b) Set up integral defining the area of the region

- c) Find the area. (Hint: you may use formula from problem 1)
- d) Sketch the solid of revolution obtained by revolving the region about the line $y = 0$.
- e) Set up the integral defining the volume of the solid by the disk/washer method
- f) Find the volume (answer in the decimal form is accepted)
- g) Sketch the solid of revolution obtained by revolving the region about the line $x = 1$.

h) Set up the integral defining the volume of the solid by the shell method

i) Find the volume of the solid (answer in the decimal form is accepted)

Problem 3 (25 points) Evaluate **any five** of the following seven integrals

a) $\int \sin(10x) \cos(3x) dx$

b) $\int \tan^2 x \sec^4 x dx$

c) $\int \frac{2x+5}{x^2+4x+5} dx$

d) $\int x \sin(100x) \, dx$

e) $\int \frac{1+x}{\sqrt{4-x^2}} \, dx$

f) $\int x \ln(100x) \, dx$

g) $\int \frac{1+x}{x\sqrt{x^2-4}} \, dx$