Mathematics 1100Y – Calculus I: Calculus of one variable
Trent University, Summer 2010
Test 2
5 July, 2010

Instructions
- *Show all your work.* Legibly, please!
- *If you have a question, ask it!*
- Use the back sides of the test sheets for rough work or extra space.
- You may use a calculator and an aid sheet.

1. Compute any *four* (4) of the integrals in parts **a-f**. *[16 = 4 × 4 each]*

a. $\displaystyle\int \frac{1}{4-x^2}\,dx$

b. $\displaystyle\int \tan(x)\,dx$

c. $\displaystyle\int_0^1 \frac{1}{\sqrt{x}}\,dx$

d. $\displaystyle\int \frac{x^3+x+1}{x^2+1}\,dx$

e. $\displaystyle\int_{-\pi/4}^{\pi/4} \sec^2(x)\,dx$

f. $\displaystyle\int x\ln(x)\,dx$

2. Do any *two* (2) of parts **a-e**. *[12 = 2 × 6 each]*

a. Compute $\displaystyle\int_0^2 (x+1)\,dx$ using the Right-hand Rule.

b. Find the area of the region bounded by $y = 2+x$ and $y = x^2$ for $-1 \le x \le 1$.

c. Without actually computing $\displaystyle\int_0^{10/\pi} \arctan(x)\,dx$, find as small an upper bound as you can on the value of this integral.

d. Compute the arc-length of the curve $y = \ln(\cos(x))$, $0 \le x \le \pi/6$.

e. Give a example of a function $f(x)$ such that $f(x) = 1 + \displaystyle\int_0^x f(t)\,dt$ for all x.

3. Do *one* (1) of parts **a** or **b**. *[12]*

a. Sketch the solid obtained by rotating the region bounded by $y = \sqrt{x}$ and $y = x$, where $0 \le x \le 1$, about the y-axis, and find its volume.

b. Sketch the cone obtained by rotating the line $y = 3x$, where $0 \le x \le 2$, about the x-axis, and find its surface area.

[Total = 40]