Mathematics 1101Y – Calculus I: functions and calculus of one variable
Trent University, 2010–2011

Test # 2
11 February, 2011
Time: 50 minutes

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. $\displaystyle\int \frac{1}{\sqrt{x^2+1}}\, dx$ **b.** $\displaystyle\int_0^{\pi/4} \sec(x)\tan(x)\, dx$ **c.** $\displaystyle\int_0^{\infty} e^{-x}\, dx$

   d. $\displaystyle\int \frac{1}{x^2+3x+2}\, dx$ **e.** $\displaystyle\int \frac{\cos(x)}{\sin(x)}\, dx$ **f.** $\displaystyle\int_1^e \ln(x)\, dx$

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

   a. Compute $\displaystyle\int_1^2 \frac{x^3 - x^2 - x + 1}{x+1}\, dx$

   b. Find the area between $y = \cos(x)$ and $y = \sin(x)$ for $0 \le x \le \dfrac{\pi}{2}$.

   c. Which of $\displaystyle\int_\pi^{41} \arctan\left(\sqrt{x}\right)\, dx$ and $\displaystyle\int_\pi^{41} \arctan\left(x^2\right)\, dx$ is larger? Explain why.

   d. Use the Right-hand Rule to compute $\displaystyle\int_1^2 x\, dx$.

   e. Find the area of the region bounded by $y = 0$ and $y = \ln(x)$ for $0 < x \le 1$.

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

   a. Sketch the solid obtained by rotating the region bounded by $y = x^2$ and $y = 0$, where $0 \le x \le 2$, about the y-axis, and find its volume.

   b. Sketch the solid obtained by rotating the region bounded by $y = x^2$ and $y = 0$, where $0 \le x \le 2$, about the x-axis, and find its volume.

[Total = 40]