Mathematics 110 – Calculus of one variable
TRENT UNIVERSITY, 2003-2004

Test #2 - Section A
Wednesday, 11 February, 2004
Time: 50 minutes

Instructions

- Please show all your work and make every effort to keep your solution neat and legible.
- If you have a question, *ask it*!
- You may use a calculator and one of an 8.5" × 11" aid sheet or the pamphlet *Formula for Success*.

1. Compute any *three* of the integrals in parts **a**-**f**. *[12 = 3 × 4 each]*

a. $\displaystyle\int_0^{\pi/2} \cos^3(x)\,dx$ **b.** $\displaystyle\int \frac{1}{x^2+3x+2}\,dx$ **c.** $\displaystyle\int_2^{\infty} \frac{1}{\sqrt{x}}\,dx$

d. $\displaystyle\int \frac{\arctan(x)}{x^2+1}\,dx$ **e.** $\displaystyle\int \ln\left(x^2\right)\,dx$ **f.** $\displaystyle\int_1^2 \frac{1}{x^2-2x+2}\,dx$

2. Do any *two* of parts **a**-**d**. *[8 = 2 × 4 each]*

a. Find a definite integral computed by the Right-hand Rule sum
$\displaystyle\lim_{n\to\infty} \sum_{i=0}^{n} \left(1+\frac{i^2}{n^2}\right)\cdot\frac{1}{n}$.

b. Compute $\displaystyle\frac{d}{dx}\left(\int_0^{\tan(x)} e^{\sqrt{t}}\,dt\right)$.

c. Find the area under the parametric curve given by $x = 1+t^2$ and $y = t(1-t)$ for $0 \le t \le 1$.

d. Sketch the region whose area is computed by the integral $\displaystyle\int_0^1 \arctan(x)\,dx$.

3. Find the volume of the solid obtained by rotating the region bounded by $y = \dfrac{1}{x}$, $y = \dfrac{1}{2}$, and $x = 1$ about the line $x = -1$. *[10]*

4. Find the area of the surface obtained by rotating the curve $y = \ln(x)$, $0 < x \le 1$, about the y-axis. *[10]*

[Total = 40]