Mathematics 1110H – Calculus I: Limits, derivatives, and Integrals

TRENT UNIVERSITY, Summer 2018

MATH 1120H Practice Test

Time: 50 minutes

Instructions

- *Show all your work.* Legibly, please! Simplify where you reasonably can.
- *If you have a question, ask it!*
- Use the back sides of all the pages for rough work or extra space.
- You may use a calculator and (all sides of) an aid sheet.

1. Compute any *four* (4) of integrals **a**–**f**. *[12 = 4 × 3 each]*

a. $\displaystyle\int \tan^2(x)\cos^3(x)\,dx$ **b.** $\displaystyle\int_2^\infty \frac{1}{y^3}\,dy$ **c.** $\displaystyle\int \frac{z^2+1}{z^2-1}\,dz$

d. $\displaystyle\int_0^{\ln(10)} te^{-t}\,dt$ **e.** $\displaystyle\int \frac{1}{2\sqrt{s}\cdot\ln(\sqrt{s})}\,ds$ **f.** $\displaystyle\int_0^3 \frac{1}{r^2+9}\,dr$

2. Do any *two* (2) of parts **a**–**c**. *[8 = 2 × 4 each]*

a. Suppose $f(x) = \displaystyle\int_0^x e^{t^2}\,dt$. Find the antiderivative of $g(x) = xf'(x)$.

b. Find the area between the curves $y = 1 - \sqrt{x}$ and $y = 1 - x^2$ for $0 \le x \le 1$.

c. Express $\displaystyle\int \sec^5(x)\,dx$ in terms of $\displaystyle\int \sec^3(x)\,dx$.

3. Do either *one* (1) of parts **a** or **b**. *[10]*

a. Use the fact that $\displaystyle\int_0^1 \frac{1}{x^2+1}\,dx = \frac{\pi}{4}$ and one of the Right-Hand Rule or the Trapezoid Rule to estimate π to within $0.4 = \frac{4}{10}$.

b. A spike has four triangular faces. Three of these faces are right-angled triangles, one with short sides of 1 *cm* each, and two which each have a short side of 1 *cm* and a short side of 10 *cm*. These triangles fit together so that the right-angle vertices coincide and the short sides match up in length. The fourth face is the triangle formed by the hypotenuses (hypotesunoi?) of the other three triangles. What is the volume of the spike?

[Total = 30]