

Mathematics 1110H – Calculus I: Limits, derivatives, and Integrals  
TRENT UNIVERSITY, Summer 2018

MATH 1120H Test

Monday, 9 July

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.**  $\int \tan^3(x) \sec^3(x) dx$       **b.**  $\int_0^1 \frac{1}{\sqrt{y}} dy$       **c.**  $\int \frac{z^2 - 1}{z^2 + 2z + 1} dz$

**d.**  $\int_1^e t \ln(t) dt$       **e.**  $\int s^2 e^s ds$       **f.**  $\int_0^3 \frac{r^2}{r^3 + 9} dr$

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

- a.** Use a Right-Hand Rule sum to approximate  $\int_0^2 2x dx$ , ensuring that it is within 1 of the exact value.
- b.** Find the area between the curves  $y = \cos(x)$  and  $y = \sin(x)$  for  $0 \leq x \leq \pi$ .
- c.** Compute  $\int \sqrt{t} \cdot e^{\sqrt{t}} dt$ .

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

- a.** The region in the first quadrant between the parabola  $y = 2x - x^2$  and the  $x$ -axis is rotated all the way about the  $y$ -axis. Find the volume of the resulting solid.
- b.** A truncated pyramid is 50  $m$  tall, has a square base with sides of length 100  $m$ , and a square top with sides of length 50  $m$  parallel to the base. Find the volume of the pyramid.

[Total = 30]