Mathematics 1110H – Calculus I: Limits, derivatives, and Integrals
Trent University, Summer 2018

MATH 1110H Test
Monday, 28 May
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 $\dfrac{dy}{dx}$ for any *four* (4) of parts **a**–**f**. *[12 = 4 × 3 each]*

    a. $y = xe^x$
    b. $x^2 - y = 1 + x$
    c. $y = \ln\left(\cos(x)\right)$

    d. $y = \tan\left(x^2\right)$
    e. $y = \cos(x) + e^{x^2}$
    f. $y = \dfrac{x-1}{x^2+1}$

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

    a. Compute $\displaystyle\lim_{t \to 0} \frac{\tan(t)}{\sin(t)}$.

    b. Find the coordinates of the tip of the parabola $y = x^2 - 2x - 3$.

    c. Find the equation of the tangent line to $y = x^2 + 1$ at the point $(1, 2)$.

    d. Use the ε–δ definition of limits to verify that $\displaystyle\lim_{x \to 1}(4x - 3) = 1$.

3. Find the domain and any and all intercepts, intervals of increase and decrease, maximum and minimum points, intervals of concavity, and inflection points of the function $g(x) = \dfrac{x+1}{x^2} = \dfrac{1}{x} + \dfrac{1}{x^2}$. *[10]*

[Total = 30]