Trent University, Summer 2023 (S61)

MATH 1110H Test

Monday, 29 May

Time: 50 minutes

Name: _____

Student Number: _____

Question	Mark	
1	____	
2	____	
3	____	
Total	____	/30

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) one letter- or A4-size aid sheet.
- If you do more than the minimum number of parts, the better ones will count.

1. Do any *two* (2) of parts **a**–**c**. *[10 = 2 × 5 each]*

a. Use the ε–δ definition of limits to verify that $\lim_{x \to -2} (-3x + 4) = 10$.

b. Compute $\lim_{x \to 0} \dfrac{x}{\tan x}$.

c. At what point, if any, does the tangent line to $y = -x^2 + 4x - 3$ have slope 10?

2. Find $\dfrac{dy}{dx}$ as best you can in any *two* (2) of parts **a**–**c**. *[10 = 2 × 5 each]*

a. $y = \dfrac{(x-2)^3}{(x-1)^2}$ **b.** $(y-2)^3 = (x-1)^2$ **c.** $y = -\ln\left(\cos\left(x^2\right)\right)$

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

a. Find the maximum area of a rectangle with each side parallel to one or the other of the x- and y-axes, with two of its corners on the x-axis, and the other two on the part of the parabola $y = \frac{1}{3}\left(4 - x^2\right)$ for which $-2 \leq x \leq 2$.

b. Find all of the vertical and horizontal asymptotes, if any, of $f(x) = \dfrac{x}{\ln(x)}$.

[Total = 30]