Trent University

MATH 1101Y Test #1

16 October, 2012

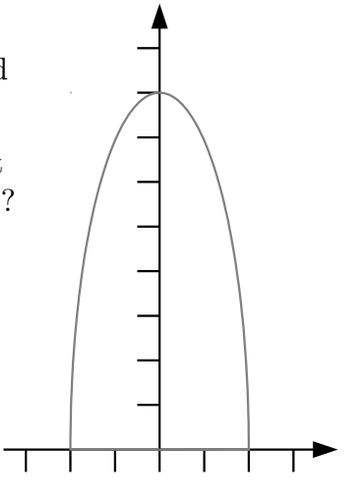
Time: 50 minutes

Instructions

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

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

a. Find the equation of the parabola with vertex at $(0, 8)$ and x-intercepts at $x = \pm 2$: that is, whose graph looks like:



b. Suppose you know that $f(x)$ is continuous at $x = a$. What can you conclude about the continuity of $g(x) = f(3x - 1)$?

c. Find all the horizontal asymptotes of $h(x) = \dfrac{1 - x^2}{1 + x^2}$.

2. Do any *two* (2) of **a**–**c**. *[12 = 2 × 6 each]*

a. Find all the discontinuities of $f(x) = \dfrac{x^3 + 3x^2 - x - 3}{x^2 - 1}$ and sketch its graph.

b. Compute $\lim\limits_{x \to 0} x \sin\left(\dfrac{1}{x}\right)$.

c. Use the limit definition of the derivative to find $f'(0)$ if $f(x) = (x + 1)^2$.

3. Do *one* (1) of **a** or **b**. *[8]*

a. Find the inverse function of $f(x) = \dfrac{x}{1 + x^2}$. What is the domain of $f^{-1}(x)$?

b. Verify that $\dfrac{2}{\tan(2x)} = \dfrac{1}{\tan(x)} - \tan(x)$.

[Total = 30]