NAME (PRINT): _____

Last / Surname First / Given Name

STUDENT #: _____ **TUTORIAL**: _____

MAT 137Y - 2018/2019
TEST 1 - VERSION A

Problem	1	2	3	4	5	Total
Points	10	10	10	10	10	50
Score						

Tutorial Sections:

◯ Jayde Silva, TUT0101 (TUE @ 1).
◯ Jayde Silva, TUT0103 (TUE @ 3).
◯ Jayde Silva, TUT0105 (TH @ 1).
◯ David Scott, TUT0108 (TH @ 3).
◯ Rodney Louis, TUT0102 (TUE @ 1).
◯ Rodney Louis, TUT0104 (TUE @ 3).
◯ Kenny Guo, TUT0107 (TH @ 3).

INSTRUCTIONS:

- **Please make sure your name, student number, and tutorial info is entered *in ink* at the top of this page.**
- **There is a 1 point penalty for missing, or incorrect TUT information.**
- **Do not begin until instructed to do so.**
- **You have 100 minutes to complete this test.**
- **Solve the following problems, and write up your solutions neatly, in black or blue ink, in the space provided. If you choose to write in pencil, you will not be eligible for a re-grade.**
- **You may use Page 9 for rough work. Your rough work will not be graded.**
- **This test contains 9 pages. Please ensure they are all there.**
- **Please do not tear out any pages.**
- **No aids are allowed.**

GOOD LUCK!

Answer the following questions in the space provided. Please give complete, detailed solutions. Correct final answers with little, or no, work, will not receive credit.

(1) (a) Let $A = (1, 3]$, $B = [-2, \pi)$, $C = \mathbb{N}$. Find $A \cap C$ and $B^c \cup A$.

$A \cap C =$_____ and $B^c \cup A =$_____.

(b) Solve the inequality $\dfrac{x^2 - 4}{x - 1} \geq 0$.

$x \in$ _____ (Use interval notation.)

(c) Find the domain of the function $f(x) = \dfrac{\sqrt{4-x^2}}{x-1}$. Express your answer in interval notation.

$\text{dom}(f) =$ _____

(d) Simplify $\tan\left(\arcsin\left(\dfrac{x}{3}\right)\right)$.

$\tan\left(\arcsin\left(\dfrac{x}{3}\right)\right) =$_____.

(e) Compute $\lim\limits_{x\to 0} \dfrac{3x-x^2}{\tan x}$. (You do not need to use $\delta - \epsilon$ here, but you cannot use L'Hopital's Rule.)

$\lim\limits_{x\to 0} \dfrac{3x-x^2}{\tan x} =$_____.

(2) Prove that the function $f(x) = \dfrac{x-2}{x+5}$ has an inverse, and find a formula for f^{-1}.

$f^{-1}(x) =$_____.

(3) (a) Give the $\delta - \epsilon$ definition of "$\lim_{x \to a} f(x) = L$".

(b) Use this definition to prove that $\lim_{x \to 2} \frac{4}{x^2} = 1$.

(4) Suppose that $\lim_{x\to 0} f(x) = 0$. Prove that $\lim_{x\to 0} f(x)\sin\left(\frac{1}{x^2}\right) = 0$.

(5) Determine if the statements below are true or false. If true, give a detailed explanation why using definitions, properties, or theorems from class. (An example will not suffice.) If false, explain why, or you may simply give an example which demonstrates why it's false. (You will receive no credit for simply guessing "true" or "false".)

(a) If $A \subseteq B^c$, then $B \subseteq A^c$.

TRUE FALSE

(b) The negation of the statement "If it's raining, then it's cloudy" is the statement "If it's not cloudy, then it's not raining".

TRUE FALSE

(c) If $f : \mathbb{R} \to \mathbb{R}$ is even, and $g : \mathbb{R} \to \mathbb{R}$ is any function, then $g \circ f$ is even.

TRUE FALSE

(d) If f is bounded, then $\lim_{x\to 0} f(x)\sin x = 0$.

TRUE FALSE

(e) If $\lim_{x\to a} f(x)g(x) = 0$, then either $\lim_{x\to a} f(x) = 0$ or $\lim_{x\to a} g(x) = 0$.

TRUE FALSE

Rough Work - This page will not be graded!