**THE UNIVERSITY OF TORONTO - MISSISSAUGA - Quiz 1 - V1**
**MAT102H5F - Fall 2019 - LEC0101-LEC0107**

**Time**: 45 minutes
**Date**: Thursday September 19, 2019. 7:10PM - 7:55PM.
**Instructors**: M. Tvalavadze, S. Fuchs, N. Askaripour, X. Wang, A. Burazin M. Pawliuk.
**Aids**: None.

**Instructions:**

- Do not write on the QR code at the top of each page.
- Only the **front** of each page will be graded. (You may use the **backs** of pages for rough work.)
- You may use Page 5 for any additional work you want graded. If you use this page, please indicate that on the original page containing the question.
- Do not remove any pages.
- Your answers to the multiple choice questions must be recorded on the final page of the booklet.
- The quiz is out of 20 points.

**Instructions**: There are five (5) multiple choice questions worth two (2) points each. Choose the answer that is most correct. Your answers must be recorded on the final page of the booklet.

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MC1 (2pts) Reese conjectures that: "$\sqrt{n}$ is irrational for every natural number $n > 1$". Her conjecture is:

A. False, because $\sqrt{2}$ is rational.
B. True, because $\sqrt{2}$ is irrational.
C. False, because $\sqrt{4}$ is rational.
D. False, because $\sqrt{-1}$ is undefined.
E. False, because $\sqrt{0}$ is rational.

MC2 (2pts) Is 0 an even integer?

A. Yes, because $2 \cdot 0 = 0$.
B. No, because 0 cannot be divided into two equal parts.
C. No, because only positive integers can be even.
D. Yes, because it is defined to be 0.
E. Yes, because $0 + 0 = 0$.

MC3 (2pts) What are **all** the integers that divide 6?

A. $1, 2, 3, 4, 5, 6$.
B. $-6, -5, -4, -3, -2, -1, 1, 2, 3, 4, 5, 6$.
C. $1, 2, 3, 6$.
D. $-6, -3, -2, -1, 1, 2, 3, 6$.
E. $2, 3$.

MC4 (2pts) How many different roots does $100x^2 + x + 100$ have?

A. 0
B. 1
C. 2
D. 3
E. 4

MC5 (2pts) You are told that 2 divides $a$ and 3 divides $b$, and $a, b$ are integers. What can you conclude?

A. $a$ must be larger than $b$.
B. $a$ must be smaller than $b$.
C. $|a|$ must be larger than $|b|$.
D. $|a|$ must be smaller than $|b|$.
E. You can't conclude anything.

**Instructions**: There are two (2) long answer questions worth five (5) points each, with multiple parts. Provide a complete solution, with justification, in the space provided.

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## Q1.1 (1 POINT)

Complete the following definition: "A number $x$ is rational if ..."

## Q1.2 (2 POINTS)

Omar claims that "$\frac{p}{q} + \frac{a}{b} = \frac{p+a}{q+b}$ for all rational numbers $\frac{p}{q}, \frac{a}{b}$". Prove his conjecture, or provide a counterexample.

## Q1.3 (2 POINTS)

Daria conjectures that "If you add three rational numbers together you always get a rational number". Prove her conjecture, or provide a counterexample.

Q2.1 (2 POINTS)

Complete the following definition: "A natural number $n$ is prime if ..."

Q2.2 (3 POINTS)

Suppose that $x$ is an integer with $x > 2$. Prove that $x^2 - 1$ is not a prime number.

**Instructions**: You may use this page for any additional work you want graded. If you use this page, please indicate that on the original page containing the question.

[End of Quiz]