

# Welcome to MAT137!

- Course website is on Quercus
  - Read the course syllabus
  - Save the test dates
  - Online forum – piazza
  - Precalculus review: <http://uoft.me/precalc>
- Problem set 1 is available and due Wednesday May 15
- Today's Topic: Logic and Quantifiers
- **Before next class, watch videos 1.7 - 1.15**

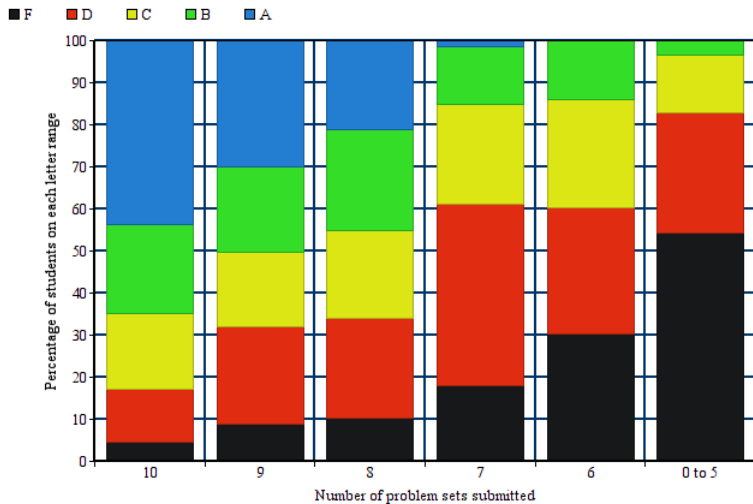
# A little about the course

- Lecturers: Kathlyn Dykes and Qin Deng
- About MAT137
- Slides uploaded to:  
<http://www.math.toronto.edu/kdykes/MAT137.html>
- Office Hours: Wednesday and Friday 4-5pm in PG003  
**Except this Friday: 12-1pm in PG003**

How did students do in MAT137 during the semester?

It depends on how many problem sets they submitted.

Performance in MAT137Y as a function of problem sets submitted (2017-2018)



Which of the following statements are equivalent to the statement,

*“No two students in this class are not on fire.”*

Which are equivalent to its negation?

1. “All student in this class, except at most one, are on fire.”
2. “Two students in this class are on fire.”
3. “For any pair of students in this class, one of them is on fire.”
4. “At least two students in this class are not on fire.”
5. “If I choose two students in this class and one of them is not on fire, then the other one is on fire.”

# Negation 1

Write the negation of these statements as simply as possible:

1. My favourite integer number is greater than 7.
2. Every student at U of T has a cellphone.
3. There is a country in the European Union with fewer than 1000 inhabitants.
4. All of my friends like pistachios.
5. I like pistachios and walnuts.

What are the following sets?

1.  $[2, 4] \cup (2, 5)$
2.  $[2, 4] \cap (2, 5)$
3.  $[\pi, e]$
4.  $[0, 0]$
5.  $(0, 0)$

What are the following sets?

1.  $A = \{x \in \mathbb{Z} : x^2 < 6\}$

2.  $B = \{x \in \mathbb{R} : x^2 < 6\}$

3.  $C = \{x \in \mathbb{N} : x^2 < 6\}$



# Set description

An irrational number is a number that is real but not rational.

$B$  is the set of positive, rational numbers and negative, irrational numbers.

Write a definition for  $B$  using only mathematical notation. (You may use the words “and”, “or”, and “such that”)

What are the following sets?

1.  $A = \{x \in \mathbb{R} : \forall y \in [0, 1], x < y\}$
2.  $B = \{x \in \mathbb{R} : \exists y \in [0, 1] \text{ s.t. } x < y\}$
3.  $C = \{x \in [0, 1] : \forall y \in [0, 1], x < y\}$
4.  $D = \{x \in [0, 1] : \exists y \in [0, 1] \text{ s.t. } x < y\}$
5.  $E = \{x \in [0, 1] : \exists y \in \mathbb{R} \text{ s.t. } x < y\}$
6.  $F = \{x \in [0, 1] : y \in \mathbb{R}, x < y\}$

True or False?

1. There is a pink elephant in this room.
2. All elephants in this room are pink.

Let

$$H = \{ \text{humans} \}$$

True or False?

1.  $\forall x \in H, \exists y \in H$  such that  $y$  gave birth to  $x$
2.  $\exists y \in H$  such that  $\forall x \in H, y$  gave birth to  $x$

# Symmetric difference

Given two sets  $A$  and  $B$ , we define

- $A \setminus B = \{x \in A : x \notin B\}$
- $A \triangle B = (A \setminus B) \cup (B \setminus A)$

Let

- $C_1 = \{ \text{students in class wearing jeans} \}$
- $C_2 = \{ \text{students sitting in the first two rows} \}$

What is the set  $C_1 \triangle C_2$ ?