MAT137Y1 – LEC0501
Calculus!

CONDITIONAL STATEMENTS

UNIVERSITY OF
TORONTO

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For next lecture

For Wednesday (Sep 19), watch the videos:

- Proofs and definitions: 1.10, 1.11, 1.12, 1.13, 1.14, 1.15

The Eiffel Tower is in Toronto

Is the following statement true or false?

If the CN Tower is in France then the Eiffel Tower is in Toronto.

Write the negation of the above statement.

True or False?

1. If $0 > 1$ then $1 > 0$.
2. If $0 > 1$ then $0 > 1$.
3. If $0 < 1$ then $1 > 0$.
4. If $0 < 1$ then $0 > 1$.
5. $\forall x \in \mathbb{R}, [x \in \mathbb{N} \Rightarrow x \in \mathbb{Z}]$.
6. $\forall x \in \mathbb{R}, [x \in \mathbb{Z} \Rightarrow x \in \mathbb{N}]$.
7. $\forall a, b \in \mathbb{R}, \left[(a+b)^2 = a^2 + b^2 \Leftrightarrow a = 0 \text{ or } b = 0\right]$.
8. $\forall a, b \in \mathbb{R}, \left[a = b \Leftrightarrow a^2 = b^2\right]$.

Increasing function

Let $f : \mathbb{R} \to \mathbb{R}$ be a function.

1. Use mathematical symbols to write that f is (strictly) increasing.

2. What is the negation of "f is (strictly) increasing"?

Cards[1]

Four cards lie on the table in front of you.
You know that each card has a letter on one side and a natural number on the other.
At the moment, you can read the symbols E, P, 3 and 8 on the sides that are up.
I tell you:

> *"If a card has a vowel on one side,*
> *then it has an odd number on the other side."*

Which cards do you need to turn over in order to verify whether I am telling the truth or not?

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[1]This slide was not used during the class. I strongly advise you to use it to train yourself since it is a very interesting exercise to check if you understood the content of the lecture. Do not hesitate to ask questions on Piazza or during Office Hours.

Graphs[2]

1. Draw the graph of a function f with domain $\mathbb{R}$ that satisfies:

$$\text{If } 2 < x < 4 \text{ then } 1 < f(x) < 2.$$

2. Draw the graph of a function g with domain $\mathbb{R}$ that satisfies:

$$2 < x < 4 \text{ if and only if } 1 < g(x) < 2.$$

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[2]This slide was not used during the class. You can use it to train yourself.

A last one on conditionals

The following statement is false:

$$\text{If today is my birthday then } 2 = 1.$$

What can you guess?