MAT137Y1 – LEC0501
Calculus!

TRIG DERIVATIVES
& IMPLICIT DIFFERENTIATION
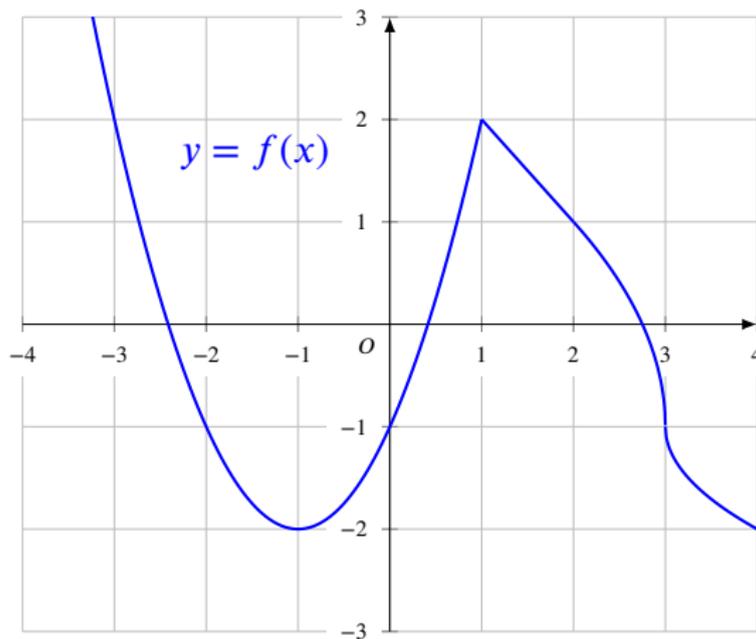
UNIVERSITY OF
TORONTO

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For next lecture

For Wednesday (Oct 31), watch the videos:

- Derivatives of exponentials and logarithms: 3.13, (3.14), 3.15, 3.16, 3.17 , 3.18
- Related rates: 3.19, 3.20, 3.21

Derivative from a graph

Below is the graph of a function f.
Sketch the graph of its derivative f'.

Let $g(x) = \cos(x)$.

Obtain and prove a formula for its derivative directly from the definition of derivative as a limit.

Derivatives of the other trig functions

Using all the basic differentiation rules, as well as

$$\sin'(x) = \cos(x), \qquad \cos'(x) = -\sin(x),$$

quickly obtain and prove formulas for the derivatives of

1 $\tan$ **2** $\cot$ **3** $\sec$ **4** $\csc$

Implicit differentiation

The equation $\sin(x + y) + xy^2 = 0$ defines a function $y = h(x)$ near $(0, 0)$. Using implicit differentiation, compute

1 $h(0)$ **2** $h'(0)$ **3** $h''(0)$ **4** $h'''(0)$