Ask. Don't Tell.

We are Assistant Professors, Teaching Stream,
at the University of Toronto

- Bernardo Galvão-Sousa
- Alfonso Gracia-Saz
- Sarah Mayes-Tang
- Jason Siefken

We are training/mentoring TAs
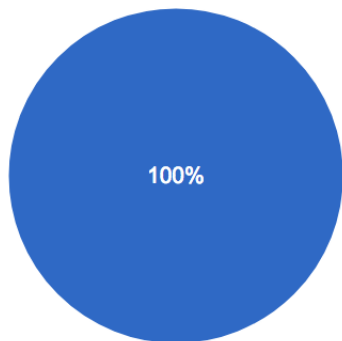- We have large numbers of TAs
- We aim to create *simple*, high-impact activities

Our main goal:
- Affect the culture

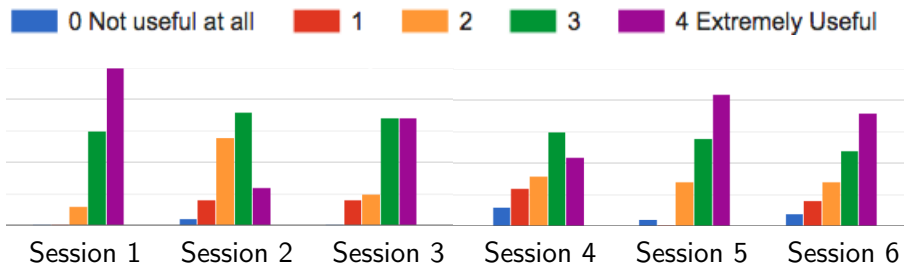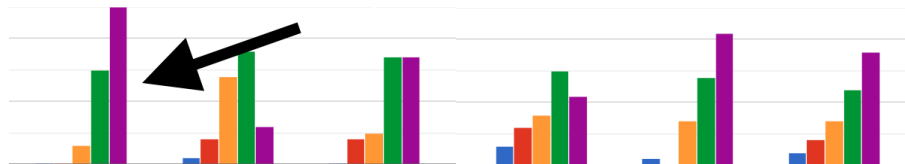"Should we continue to host these **mandatory** training sessions for first-time TAs?"

Survey to our TAs

"Rate the usefulness of [the different training sessions]"

"Rate the usefulness of [the different training sessions]"

ASK.
DON'T
TELL

Ask. Don't Tell.

Warm up

Take 45 seconds to look over the following list of pairs of words, but **do not write anything down**.

bread/b_tter	ocean/breeze
leaf/tree	music/l_rics
sweet/sour	sh_e/sock
phone/bo_k	movie/actress
chi_s/salsa	gasoline/engine
high school/college	pen_il/paper
river/b_at	turkey/stuffing
fruit/vegetable	be_r/wine
computer/chip	television/rad_o
l_nch/dinner	chair/couch

Warm up: What do you remember?

Write down as many pairs of words as you can.

You do *not* need to remember which letters were missing or which column they were in.

Warm up: What did you remember?

Label each pair you remembered A or B, and count them.

A	B
ocean/breeze	bread/b_tter
leaf/tree	music/l_rics
sweet/sour	sh_e/sock
movie/actress	phone/bo_k
gasoline/engine	chi_s/salsa
high school/college	pen_il/paper
turkey/stuffing	river/b_at
fruit/vegetable	be_r/wine
computer/chip	television/rad_o
chair/couch	l_nch/dinner

Table: Word list from The Talent Code (by Daniel Coyle).

According to The Talent Code by Daniel Coyle, on average people remember 3 times as many pairs in column B, the one with missing letters.

The claim is that a moment of struggle makes all the difference.

Can you help a student figure things out
rather than solving the problem for them?

1. Where is the student?

2. Help minimally.

3. Ask. Don't tell.

Brett

Derivatives proof through limit. Is it right if I say:

$$f(a + h) = f(a) + h$$

Shouldn't it be:

$$f(a + h) = f(a) + f(h)$$

1. What is Brett actually asking?
2. How do we help Brett?

Brett

Brett writes on piazza:

Derivatives proof through limit. Is it right if I say:

$$f(a + h) = f(a) + h$$

Shouldn't it be:

$$f(a + h) = f(a) + f(h)$$

Instructor

$f(a + h)$, $f(a) + f(h)$, and $f(a) + h$ are three completely unrelated things. None of them is necessarily equal to any other one.

Exercise: Come up with functions that demonstrate this. Do it, and give your answer below.

Brett

Brett:

I see,
$f(x) = 2x$, $a = 2$, $h = 4$
$f(a + h) = f(6) = 12$
$f(a) + f(h) = f(2) + f(4) = 4 + 8 = 12$
$f(a) + h = f(2) + 4 = 4 + 4 = 8$

Instructor:

Now, give an example where all three are different.

Brett:

$f(x) = 2x + 1$, $a = 2$, $h = 4$
$f(a + h) = f(6) = 13$
$f(a) + f(h) = f(2) + f(4) = 5 + 9 = 14$
$f(a) + h = f(2) + 4 = 5 + 4 = 9$

Emily

Emily asks on piazza:

Problem Set B asks Write a formal definition of the concept
$\lim_{x \to \infty} f(x) = \infty$.

My definition is as follows:
Let f be a function defined on some open interval (p, ∞), where $p \in \mathbb{R}$.
$\exists A, M \in \mathbb{R} \quad x > M \implies f(x) > A$.

- How do we help Emily?

Emily

Emily asks on piazza:

Problem Set B asks Write a formal definition of the concept
$\lim_{x \to \infty} f(x) = \infty$.

My definition is as follows:
Let f be a function defined on some open interval (p, ∞), where $p \in \mathbb{R}$.
$\exists A, M \in \mathbb{R} \quad x > M \implies f(x) > A$.

Instructor:

Let f be the constant function 1.
Then let $A = 0.5$ and M any real number.
Then $x > M \implies f(x) > A$.
So, using your definition, I've proved that the limit of the constant
function 1 is infinite.
Does that seem right?

Emily

Sam

Sam asks on Stack Exchange:

Need help with this word problem, not sure how to complete this question. A cop is trying to catch drivers who speed on the highway. She finds a long stretch of the highway. She parks her car behind some bushes, 400 metres away from the highway. There is a traffic sign at the point of the road closest to her car, and there is a phone by the road 600 metres away from the traffic sign.

The cop points her radar gun at a car and learns that, as the car is passing by the phone, the distance between the car and the cop is increasing at a rate of 80 km/h. The speed limit is 120 km/h. Can she fine the driver?

Helper:

Have you drawn a diagram? Always start by drawing a diagram. Also, try to convert units so that they match with each other.

Sam

S: (18:25) yes, I have drawn a diagram but I don't know what to do after that.

H: (18:30) Since the police officer is facing the highway, and cars are moving on the highway, which as we can now deduce is orthogonal to the line of sight of the officer, we essentially have a triangle. Why? Because the distance between the officer and the car forms the hypotenuse of a right triangle. You also *know* what the rate of change of that hypotenuse is, 80km/h. Getting any ideas?

S: (18:32) Ok, so how would i complete the question from that point?

H: (18:33) Can you think of a relationship that relates the hypotenuse to two other sides of a triangle?

S: (18:36) No, I'm not really sure

H: (18:41) How about Pythagoras's theorem? Use that to relate the distance between the officer to the other sides of the "triangle"

S: (18:43) Could you show me the first few steps?

H: (18:50) We know that there is a triangle formed by the police officer's distance from the bushes to the highway, the distance between the police officer and the car, as well as the distance between the car to

y=f(x)
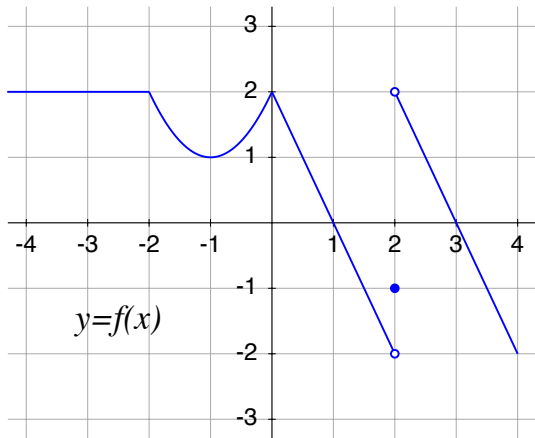
1. Guess most common answers.
2. How do we help students?

- Haynes Miller and the EMES seminar
- CoMInDS
- Bernardo Galvão-Sousa
- Ivan Khatchatourian
- Sarah Mayes-Tang
- Jason Siefken
- and our students

Thank you!