

All work is to be done in a mathematica or Jupyter notebook.

Please refer to the GitHub Repo for commands and examples.

Submissions must be made electronically to blackboard

You will be graded on the output that I am able to generate from your commands.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

1. Let  $a$  be the digit corresponding to your first initial in the table above. Consider the function

$$f(x) = \frac{\tan(ax)}{x}.$$

- (a) Graph the function on a small enough interval to identify what is happening when  $x = 0$ .
  - (b) In words, guess what the  $\lim_{x \rightarrow 0} f(x)$  is equal to.
  - (c) Use the computer to compute the limit.
  - (d) Do you think this is always the value or is somehow specific to your problem? Explain in words.
2. Consider the limit, where  $a$  is as defined above,

$$\lim_{x \rightarrow 0} \frac{e^{ax} - 1}{x}.$$

- (a) Find the limit.
  - (b) Use the precise definition of the limit to find the value of  $\delta$  that corresponds to an  $\epsilon = .5$ . Explain in words how you did this.
3. Consider the function, where  $a$  is as defined above

$$g(x) = 6x + a \sin x$$

- (a) Find the derivative of the function.
- (b) Find the equation of the tangent line at the point  $(\frac{\pi}{6}, \pi + \frac{a}{2})$ .
- (c) Graph both the function and the line on the same axis.