

October 17, 2025

National Pasta Day

Today in History:

Al Capone goes to prison (1931)

Earthquake rocks San Francisco (1989)

Number of the Day: 129

129 = 3 x 43

129 is 10000001 in binary.

Fun Fact:

In the United States, you are more likely to be killed by a bee sting than a shark attack.

Quote of the Day:

“If we don’t succeed, we run the risk of failure.”

- J. Danforth Quayle

Today’s Weather:

Sunshine and clouds mixed, high of 67°.

Math 121 - Quiz #26

If $f(4) = 3$ and $f'(4) = 2$,

use a local linear approximation to estimate

$$f(3.9)$$

$$L(x) = f(a) + f'(a)(x - a)$$

$$L(x) = 3 + 2(x - 4)$$

$$\begin{aligned} f(3.9) &\approx L(3.9) = 3 + 2(3.9 - 4) \\ &= 3 - .2 \\ &= 2.8 \end{aligned}$$

TEST 2

		90-100	234
		80-89	161
		70-79	65
		60-69	26
		50-59	14
		↓	7
HIGH	100	(5)	
→ AVE	85.52		
↪ MED	89		

MID TERM GRADES

$$T1 + T2 + 25 \text{ QUIZZES} = 300 \text{ POINTS}$$

$$A: 270 - 300 \quad 181$$

$$B: 240 - 269 \quad 198$$

$$C: 210 - 239 \quad 82$$

$$D: 180 - 209 \quad 31$$

$$\downarrow \quad 18$$

① EASY

②d $h(x) = 3^{f(x)}$

$$h'(x) = 3^{f(x)} \ln 3 \cdot f'(x)$$

$$h'(3) = 3^{f(3)} \ln 3 \cdot f'(3)$$

$$= 9 \ln 3 (-1)$$

③a $y = \ln((\ln x)^3)$

$$y = 3 \ln(\ln x)$$

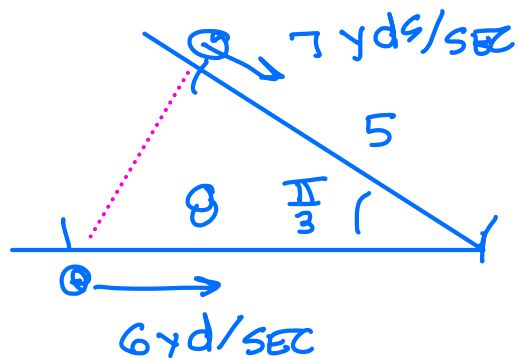
$$y' = 3 \frac{1}{\ln x} \cdot \frac{1}{x}$$

③c $\ln y = \ln(x^2+1)^{\sin x} = \sin x \ln(x^2+1)$

$$\frac{1}{y} \frac{dy}{dx} = \sin x \frac{2x}{x^2+1} + (\cos x) \ln(x^2+1)$$

$$\frac{dy}{dx} = (x^2+1)^{\sin x} \left[\sin x \frac{2x}{x^2+1} + \cos x \ln(x^2+1) \right]$$

4b



$$c^2 = a^2 + b^2 - 2ab \cos \theta$$

$$c^2 = a^2 + b^2 - \cancel{2ab} \cos(\cancel{\frac{\pi}{3}})$$

$$c^2 = a^2 + b^2 - ab$$

$$2c \frac{dc}{dt} = 2a \frac{da}{dt} + 2b \frac{db}{dt} - a \frac{db}{dt} - b \frac{da}{dt}$$

$$a = 8 \quad b = 5$$

$$\rightarrow c^2 = 64 + 25 - 40 = 49 \quad c = 7$$

$$\frac{da}{dt} = -6$$

$$\frac{db}{dt} = -7$$

$$2(7) \frac{dc}{dt} = 2(8)(-6) + 2(5)(-7) - 8(-7) - 5(-6)$$

$$\frac{dc}{dt} = -5.7 \text{ yd/sec}$$

EXTREME VALUE THM (E.V.T.)

IF $f(x)$ IS CONT. ON $[a, b]$

THEN $f(x)$ MUST HAVE BOTH

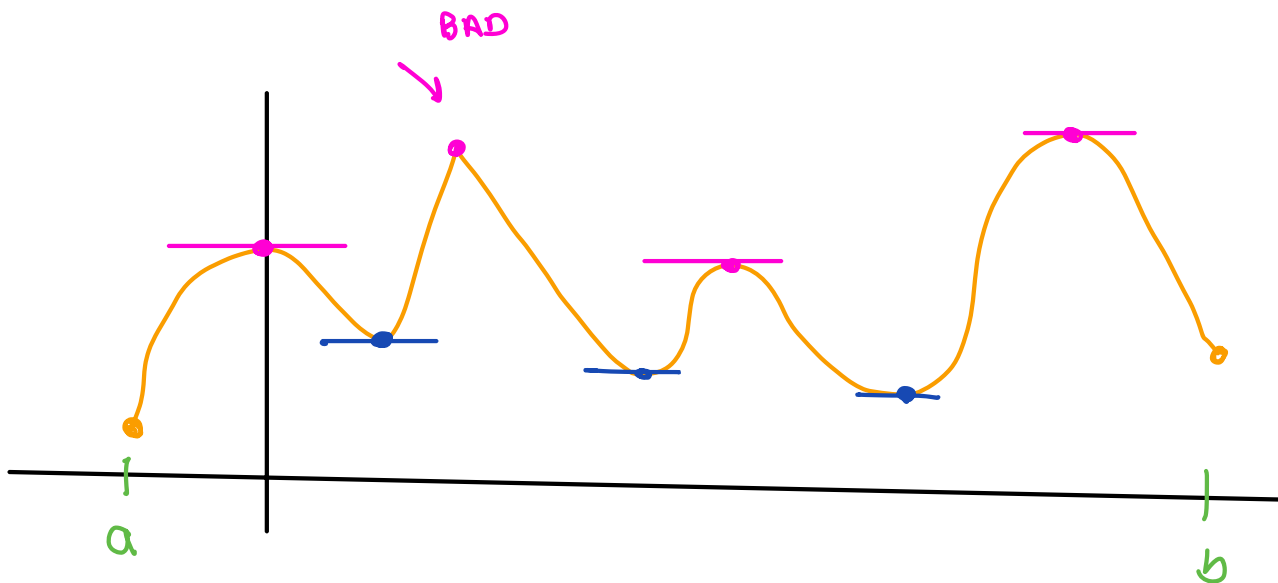
A ^{ABS.} MAX. AND A ^{ABS.} MIN. ON $[a, b]$

ABS. MAX $f(c) \geq f(x)$ FOR ALL x IN $[a, b]$

ABS. MIN $f(c) \leq f(x)$ FOR ALL x IN $[a, b]$

LOCAL MAX $f(c) \geq f(x)$ FOR x "AROUND" c

LOCAL MIN $f(c) \leq f(x)$ FOR x "AROUND" c

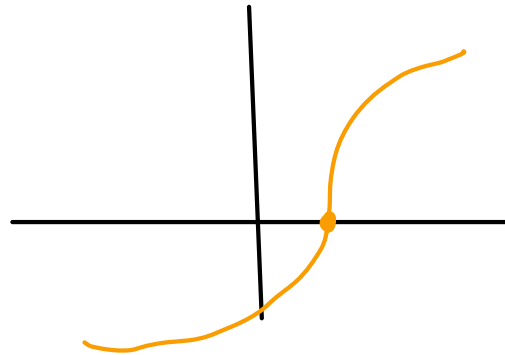
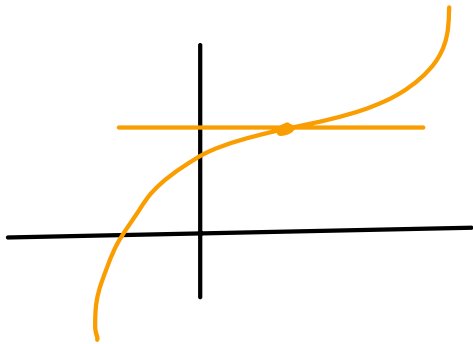


CRITICAL POINT

$f'(c) = 0$ OR $f'(c)$ IS UNDEFINED

LOCAL max/min $\Rightarrow$ CRITICAL POINTS

CRITICAL POINTS $\nRightarrow$ LOCAL max/mins



ABS max/min

LOOK AT CRITICAL POINTS
OR END POINTS.

$$f(x) = x^3 - 3x^2 \quad \underline{[-1, 3]}$$

$$f'(x) = 3x^2 - 6x$$

$$3x^2 - 6x = 0$$

$$3x(x - 2) = 0 \quad \underline{x = 0, 2}$$

x	$f(x) = x^3 - 3x^2$
0	0
2	-4
-1	-4
3	0

A hand-drawn table with two columns. The first column is labeled 'x' and the second is labeled ' $f(x) = x^3 - 3x^2$ '. The rows contain the values (0, 2, -1, 3) for x and (0, -4, -4, 0) for f(x). A bracket on the right side of the table groups the values at x=2 and x=-1, with a pink line pointing to the value -4 and the word 'min' written in pink. Another bracket on the right side of the table groups the values at x=0 and x=3, with an orange line pointing to the value 0 and the word 'max' written in orange.

$$f(x) = x^{\frac{1}{3}} (x+4)^{\frac{2}{3}} \quad \underline{[-5, 1]}$$

$$f'(x) = x^{\frac{1}{3}} \left(\frac{2}{3} (x+4)^{-\frac{1}{3}} \right) + (x+4)^{\frac{2}{3}} \left(\frac{1}{3} x^{-\frac{2}{3}} \right)$$

$$= \frac{2x^{\frac{1}{3}}}{3(x+4)^{\frac{1}{3}}} + \frac{(x+4)^{\frac{2}{3}}}{3x^{\frac{2}{3}}}$$

$$= \frac{2x^{\frac{1}{3}} x^{\frac{2}{3}}}{3(x+4)^{\frac{1}{3}} x^{\frac{2}{3}}} + \frac{(x+4)^{\frac{2}{3}} \frac{(x+4)^{\frac{1}{3}}}{(x+4)^{\frac{1}{3}}}}{3x^{\frac{2}{3}} (x+4)^{\frac{1}{3}}}$$

$$= \frac{2x + x+4}{3(x+4)^{\frac{1}{3}} (x^{\frac{2}{3}})} = \frac{3x+4}{3(x+4)^{\frac{1}{3}} (x^{\frac{2}{3}})}$$

$$3x+4=0 \quad x = -\frac{4}{3}$$

$$3(x+4)^{\frac{1}{3}} x^{\frac{2}{3}} = 0 \quad x=0, -4$$

	x	
C.P.	$-\frac{4}{3}$	-2.12 ← min
	0	0
	-4	0
E.P.	-5	2.92 ← max
	1	-1.71