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

$$f(3.9)$$

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

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

$f(3.9) \approx L(3.9) = 3 + 2(3.9-4)$

$= 3 - .2$

$= 2.8$

TEST 2

HIGH	100	(5)
AVE	85.52	
MED	89	

90–100	234
80–89	161
70–79	65
60–69	26
50–59	14
↓	7

MID TERM GRADES

T1 + T2 + 25 QUIZZES = 300 POINTS

A:	270 - 300	181
B:	240 - 269	198
C:	210 - 239	82
D:	180 - 209	31
↓		18

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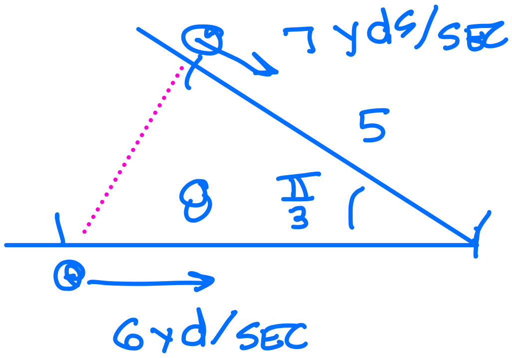
1) EASY

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)
$$y = \ln((\ln x)^3)$$
$$y = 3 \ln(\ln x)$$
$$y' = 3 \frac{1}{\ln x} \frac{1}{x}$$

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



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

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

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

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

$a = 8 \qquad b = 5$

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

$$\frac{da}{dt} = -6 \qquad \frac{db}{dt} = -7$$

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

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

EXTREME VALUE THM
(E.V.T.)

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

THEN $f(x)$ MUST HAVE BOTH

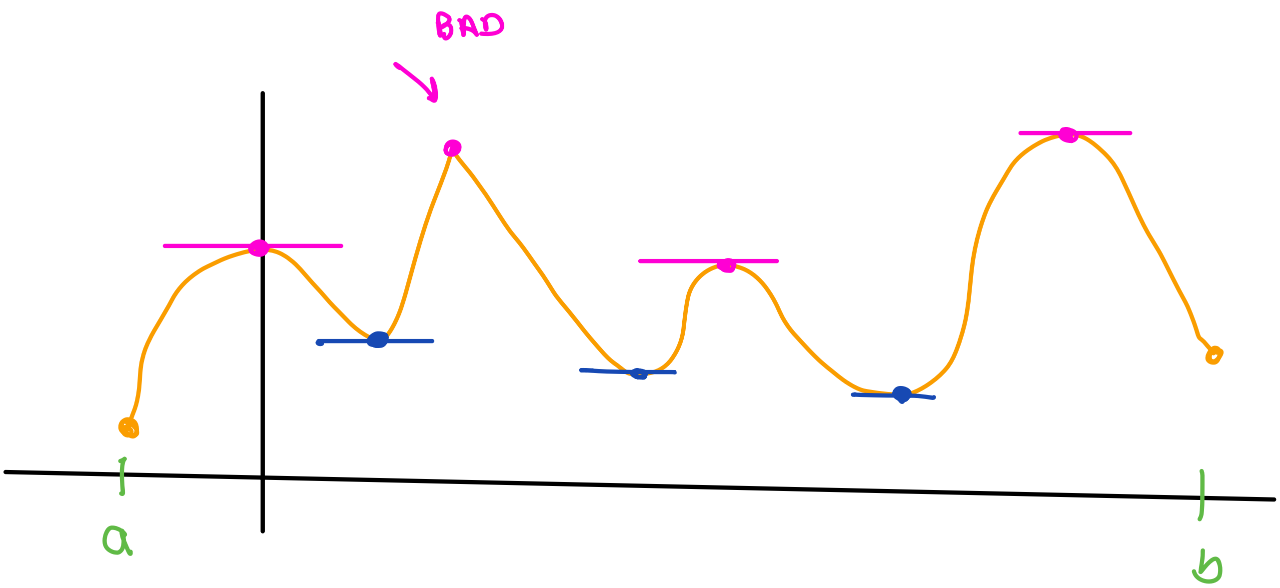
A ABS MAX. AND A ABS. MIN. ON $[a,b]$

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

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

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

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

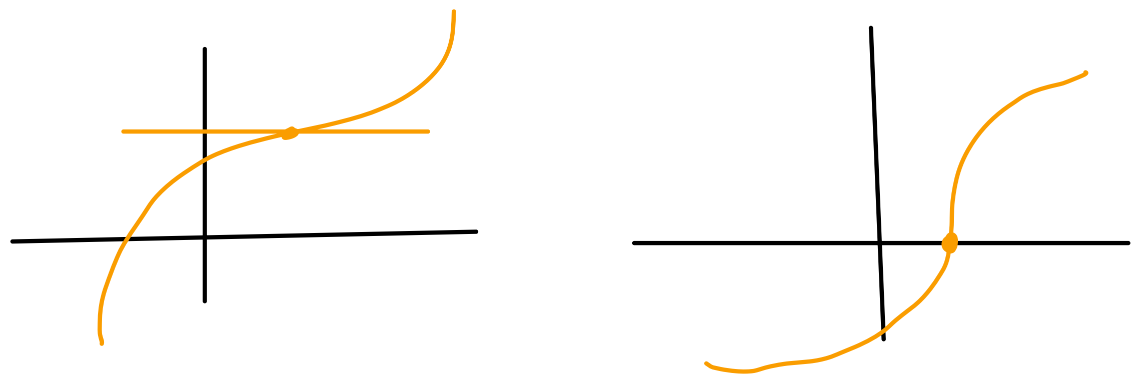


CRITICAL POINT

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

LOCAL MAX / MIN $\Rightarrow$ CRITICAL POINTS

CRITICAL POINTS $\not\Rightarrow$ LOCAL MAX/MINS



ABS MAX / MIN

LOOK AT CRITICAL POINTS

OR END POINTS.

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

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

$3x^2 - 6x = 0$

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

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

MAX

MIN

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

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

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

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

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

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

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

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