October 16, 2026

National Boss Day

Today in History:

Marie-Antoinette is beheaded (1793)

Baby Jessica rescued from a well (1987)

Number of the Day: 1124

1124 = 2 x 2 x 281

1124 is the maximum number of regions into which 34 circles divide a plane.

Fun Fact:

McDonald's once made bubblegum-flavored broccoli.

Quote of the Day:

"Don't go around saying the world owes you a living. The world owes you nothing. It was here first."

-Mark Twain

Today's Weather:

Shower and thundershowers this morning.. High 71^{o}

Math 121 - Quiz #26

If $f(2) = 5$ and $f'(2) = 2$,

use a local linear approximation to estimate

$$f(2.1)$$

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

$L(x) = 5 + 2(x - 2)$

$f(2.1) \approx L(2.1) = 5 + 2(2.1 - 2)$

$= 5 + .2 = 5.2$

MATH 121 TEST 2

HIGH 100 (16)

AVE 86.93

MED 89

90-100	189
80-89	157
70-79	47
60-69	12
50-59	5
↓	6

MID TERM GRADE

TEST 1	100
TEST 2	100
50 QUIZZES	100
	300

A:	270-300	133
B:	240-269	181
C:	210-239	73
D:	180-209	19
	↓	10

(2a) $f(x+h) - f(x) = h^2x^2 + 3hx + h\cos h$

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

$$= \lim_{h\to 0} \frac{h^2x^2 + 3hx + h\cos h}{h} =$$

$$= 3x + 1$$

$$f'(1) = 4$$

(3a) $f(x) = e^{3x}$ $\quad f''(x) = 9e^{3x}$

$f'(x) = 3e^{3x}$ $\quad \vdots$

$$f^{2026}(x) = 3^{2026} e^{3x}$$

(4a) $y = e^{x^2} + 7^{e^x}$

$$\frac{dy}{dx} = 2xe^{x^2} + 7^{e^x} \ln 7 \cdot e^x$$

(5b) $\tan\theta = x$

$$\sec^2\theta \frac{d\theta}{dt} = \frac{dx}{dt}$$

$\theta = \frac{\pi}{6}$ $\quad \frac{d\theta}{dt} = \frac{5 \text{ REV}}{\text{MIN}} \cdot \frac{2\pi}{\text{REV}} = 10\pi$

$$\sec^2\left(\frac{\pi}{6}\right)(10\pi)$$

$$\frac{4}{3}(10\pi) = \frac{40\pi}{3} \text{ km/min}$$

EXTREME VALUES

E.V.T. (EXTREME VALUE THM)

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

THEN $f(x)$ MUST HAVE BOTH

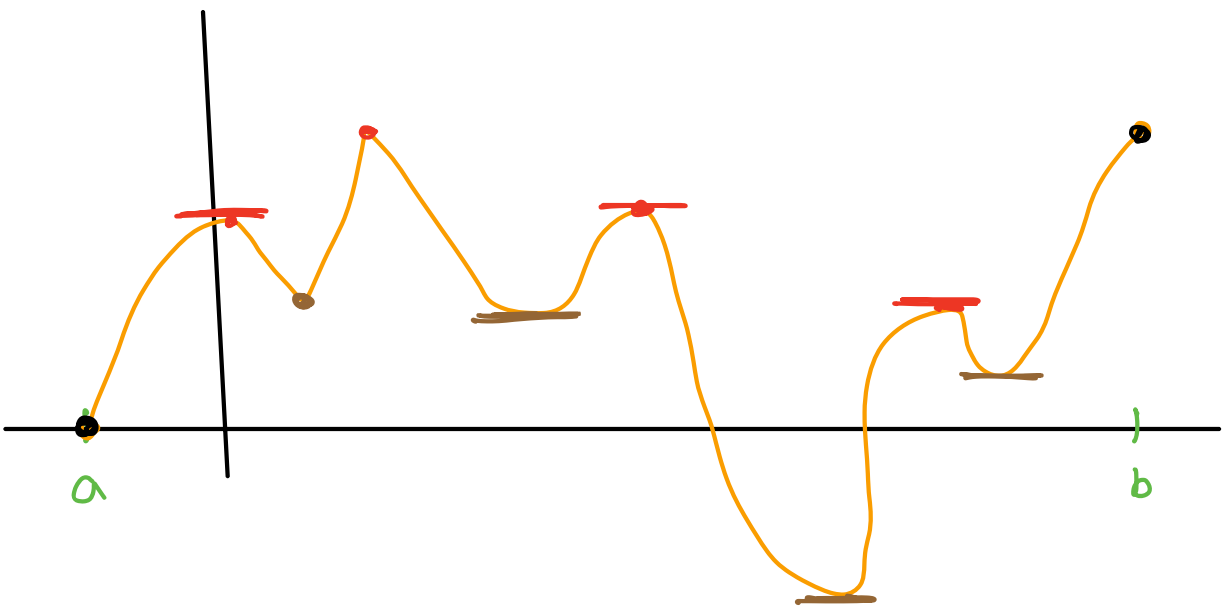
AN ABS. MIN. AND ABS. MAX ON $[a,b]$

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

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

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

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

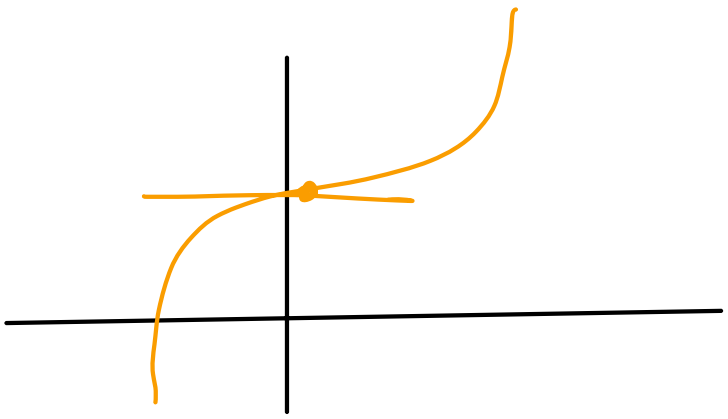


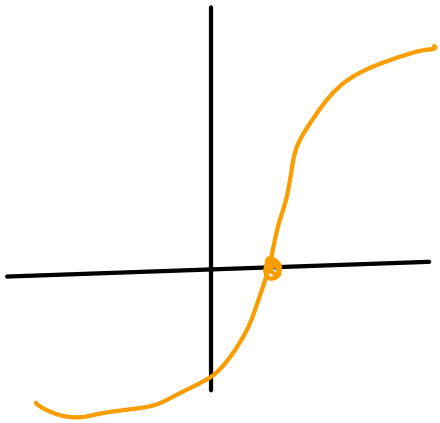
CRITICAL POINTS $f'(x) = 0$

$f'(x)$ IS UNDEFIN.

LOCAL MAX/MIN $\Rightarrow$ CRITICAL POINTS.

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





HOW TO FIND ABS. MAX/MIN

LOOK AT CRITICAL POINTS / END POINTS

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

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

$3x^2 - 6x = 0$

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

	x	$f(x)$ $x^3 - 3x^2$
C.P.	0	0
C.P.	2	-4
E.P.	-1	-4
E.P.	3	0

ABS. MIN

ABS. MAX

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

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

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

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

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

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

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

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

$x = -4$

C.P. $x = 0, -4, -\frac{4}{3}$

E.P $x = -5, 1$

	x	$x^{\frac{1}{3}}(x+4)^{\frac{2}{3}}$	
C.P.	$-\frac{4}{3}$	-2.12	$\rightarrow$ ABS MIN
C.P.	0	0	
C.P.	-4	0	
E.P	-5	2.92	— ABS. MAX
E.P	1	-1.71	