December 1, 2021

Curve Sketching Review

Test around asymptotes!

2/ Inc / Dec
1) crit pts.
2) Test pts.

3/ Concave Up/Down
2) $f'' = 0$
2) Test pts.

Infl pts ↓ $x = -2, 2$

Relative Extrema

1st Deriv Test

1) find crit pts
2) Test pts
3) Mountain Test

2nd Deriv Test

1) Find crit pts.
2) Put crit pts in f''.

$f''(-3) = +$ or $-$

$+$ → Rel min $-$ → Rel max

Pts of non-diff.

$f'(x)$ = no fraction

$f'(x)$ = fraction ← where denom = 0

$f(x) = x^{2/3}$

$f'(x) = \frac{2}{3}x^{-1/3}$

$= \frac{2}{3x^{1/3}}$

$x = 0$

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6/ Absolute Extrema — Most missed!

[#, #] (-1, 8)

1) find crit $f(x) = x^3 - 6x^2$ 69-96

$\lim_{x \to -1} x^3 - 6x^2 = -1 - 6 = -7$

$\lim_{x \to 8} x^3 - 6x^2 = 512 - 384 = \underline{128}$

$f'(x) = 3x^2 - 12x = 0$

$3x(x-4) = 0$

$x = 0, 4$

0	0
4	-32

Abs min (4, -32)
No Abs max

Vertical

$$\lim_{x \to \#} f(x) = \pm\infty$$

Horiz

$$\lim_{x \to \pm\infty} f(x) = \#$$

Slants/Curvilinear – Long Division

#9 Graph of Deriv.

Crit Pts $= -3, 3$

$f'(x) = 0 =$ x-int

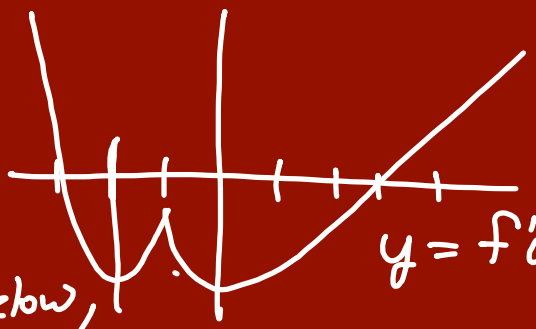
Inc/Dec - where $f'(x) = +/-$ above/below

$+ \;|\; - \;|\; +$

$-3 \quad 3$

Inc $(-\infty, -3)\ (3, \infty)$

Dec $(-3, 3)$



$y = f'(x)$

Concavity = f'(x) has rel max/min where f' inc/dec

$= \;|\; + \;|\; - \;|\; +$

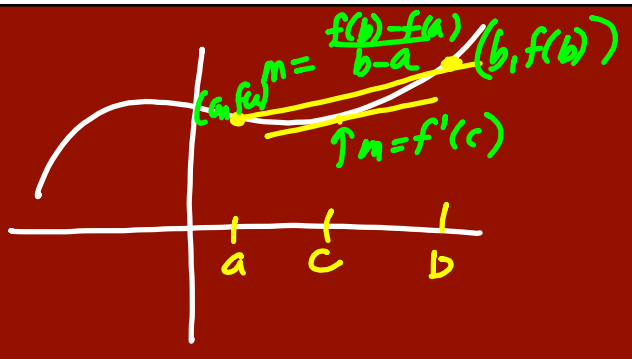
$-2 \quad -1 \quad 0$

Concave Up $(-2, -1)\ (0, \infty)$

Concave Down $(-\infty, -2)(-1, 0)$

Mean Value Thm

1) f continuous $[a, b]$
2) f differentiable (a, b)
3) $f'(c) = \frac{f(b)-f(a)}{b-a}$



11(a) $f(x) = \frac{1}{3}x^3 + 2x$ $(0, 3)$

$f'(x) = x^2 + 2$

$c^2 + 2 = \frac{f(3)-f(0)}{3-0}$

$c^2 + 2 = \frac{15-0}{3-0}$

$c^2 + 2 = 5$

$\sqrt{c^2} = \sqrt{3}$

$c = \pm\sqrt{3}$ $(0, 3)$

$\approx \pm 1.732$ not in interval

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