

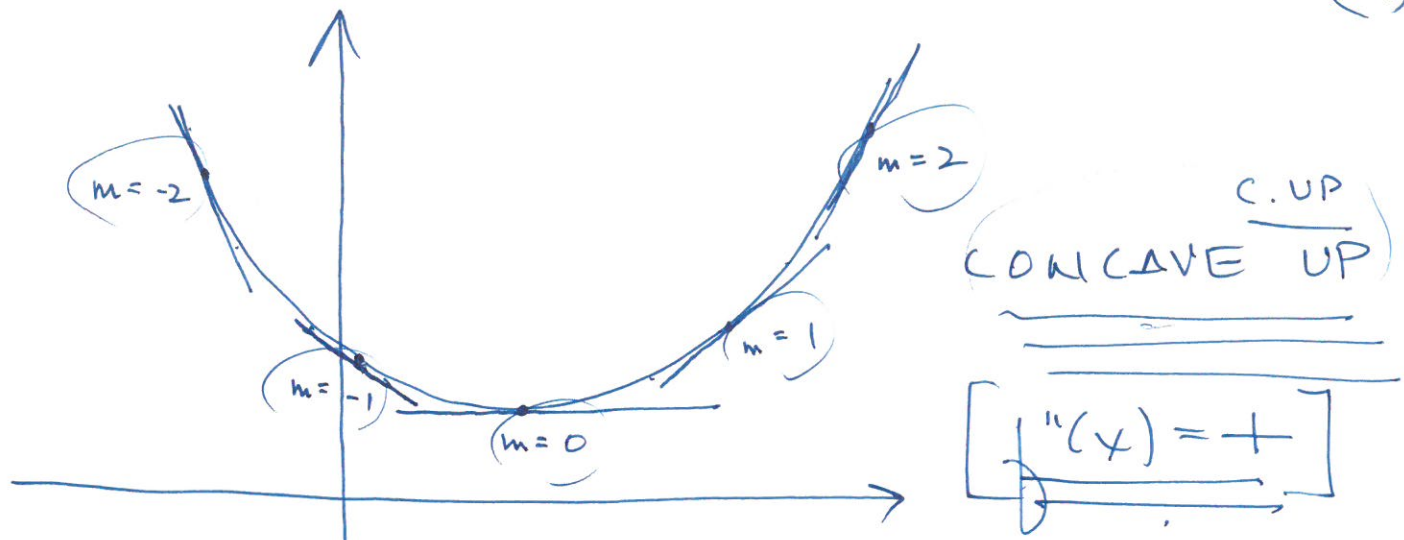
Thursday, September 27

2.2: USING $f''(x)$:from 2.1: USING $f'(x)$:

- ① $f'(x) = 0$; $f'(x)$ undef. (CRIT. NUMBERS)
- ↑ "FLAT" (horiz. tangent line)
- ↑ "STEEP" (vert. tangent line)

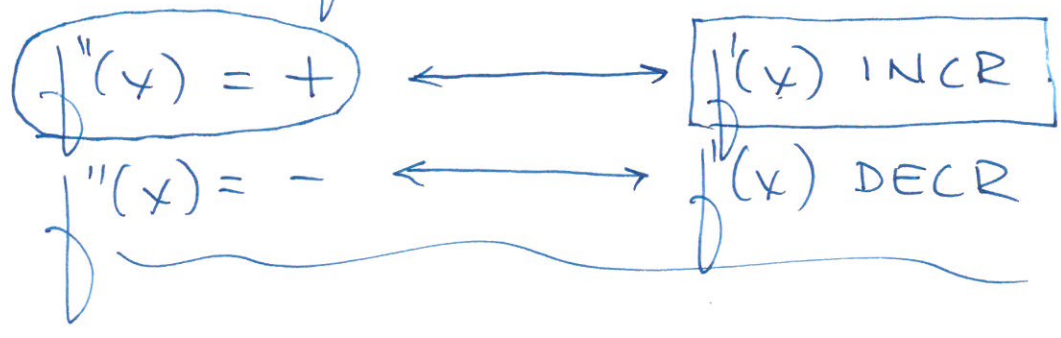
- ② where is $f'(x) = +$; $f'(x) = -$
- ↑ $f(x)$ INCR
- ↑ $f(x)$ DECR.

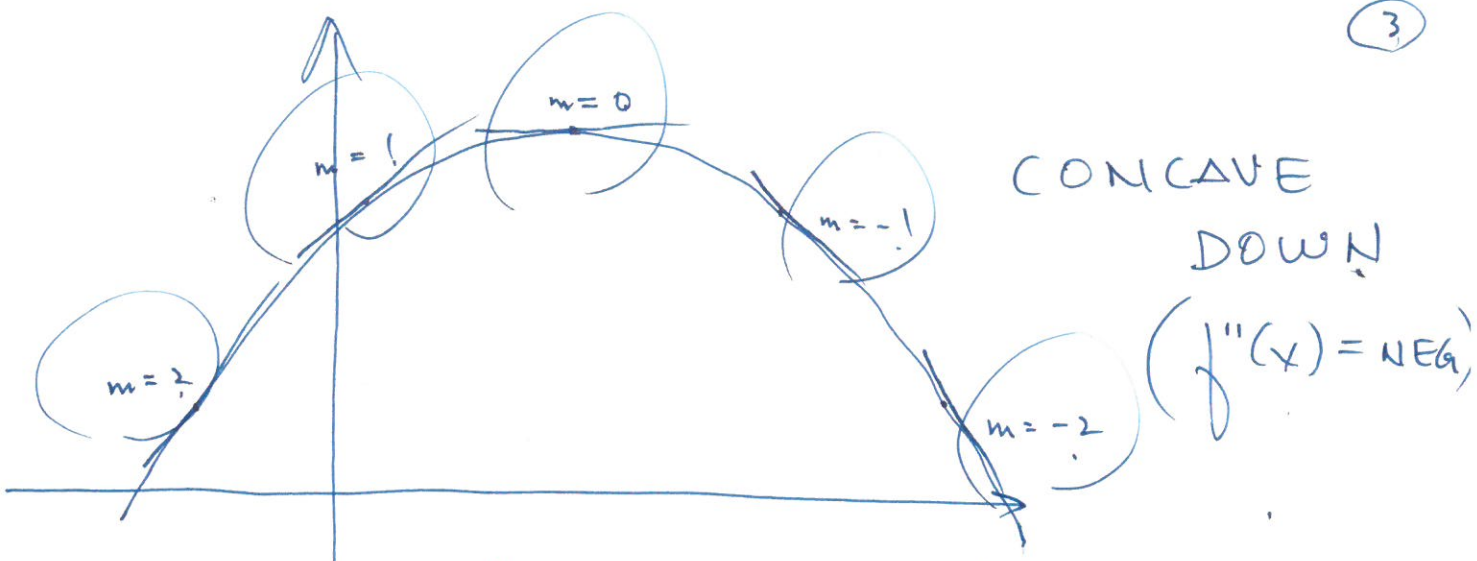
① find $f''(x)$:② $f''(x) = 0$; $f''(x)$ undef.③ where is $f''(x) = +$; $f''(x) = -$



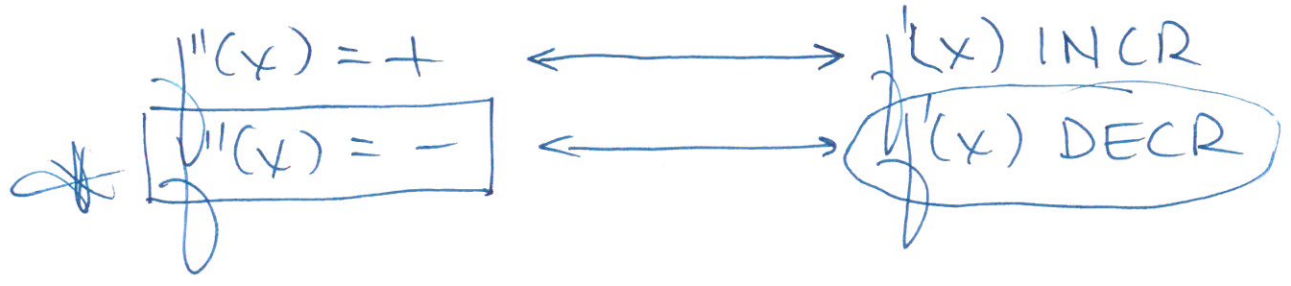
Slopes are increasing
 ↑ (from left to right)

DERIV.
 ($f'(x)$)



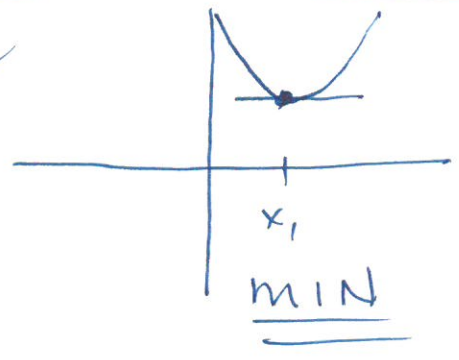


slopes are decreasing
 \uparrow
 $f'(x)$



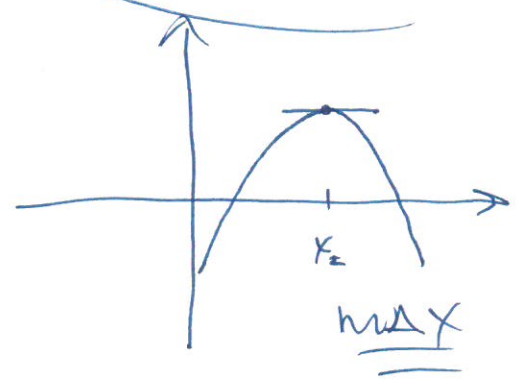
✓ $f'(x) = 0$
FLAT

$f''(x) = +$ ✓
 CONCAVE UP



$f'(x_2) = 0$
FLAT

$f''(x_2) = -$
 CONCAVE DOWN



$$f(x) = 2x^3 - 3x^2 - 36x + 28$$

$$f'(x) = 6x^2 - 6x - 36 \checkmark$$

① $f'(x) = 0$

② ~~$f'(x)$ undef.~~

$$6x^2 - 6x - 36 = 0$$

$$6(x^2 - x - 6) = 0$$

$$\boxed{6(x-3)(x+2)} = 0$$

$$x-3=0 \quad \text{or} \quad x+2=0$$

$$x=3$$

$$x=-2$$

$$(3, ?) = (3, -53)$$

$$(-2, ?) = (-2, 72)$$

$$f(3) = 2(3)^3 - 3(3)^2 - 36(3) + 28$$

$$f(3) = 54 - 27 - 108 + 28$$

$$f(3) = -53$$

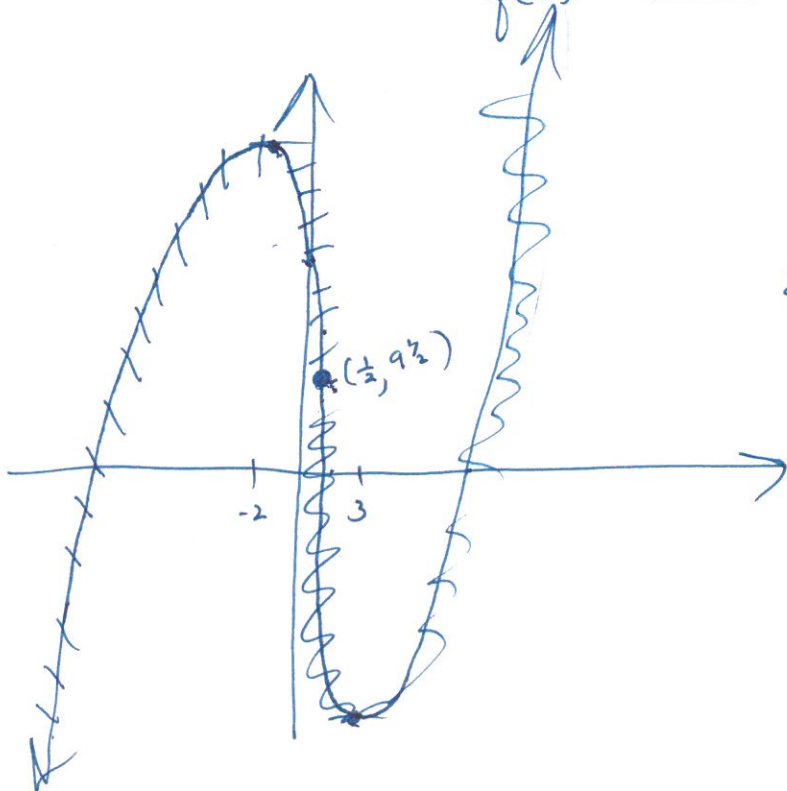
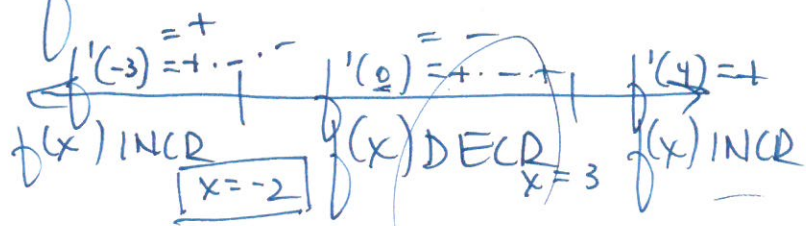
$$f(-2) = 2(-2)^3 - 3(-2)^2 - 36(-2) + 28$$

$$f(-2) = -16 - 12 + 72 + 28$$

$$f(-2) = 72$$

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

$$f'(x):$$



$$f'(x) = 6x^2 - 6x - 36$$

$$f''(x) = 12x - 6$$

$$\textcircled{1} f''(x) = 0$$

~~$f''(x)$ undefined~~

$$12x - 6 = 0$$

$$12x = 6$$

$$x = \frac{1}{2}$$

$$\left(\frac{1}{2}, f\left(\frac{1}{2}\right)\right) = \left(\frac{1}{2}, 9\frac{1}{2}\right)$$

point of inflection

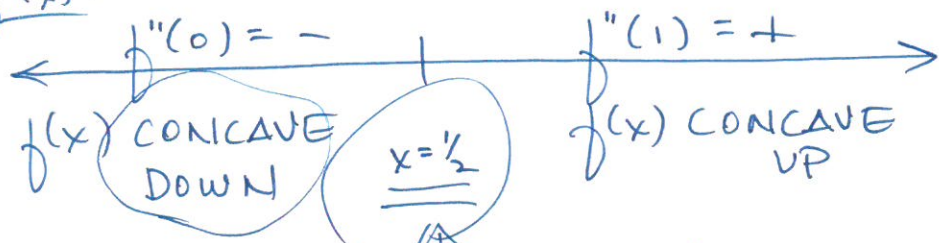
$$f\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right)^3 - 3\left(\frac{1}{2}\right)^2 - 36\left(\frac{1}{2}\right) + 28$$

$$f\left(\frac{1}{2}\right) = \frac{1}{4} - \frac{3}{4} - 18 + 28 = 9\frac{1}{2}$$

$$28 - 18 - \frac{1}{2}$$

$$f''(x) = 12x - 6$$

$f''(x)$:



changed

CONCAVITY
point of inflection

not a polynomial

$$f(x) = (x+1)^{2/3}$$

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

① ~~$f'(x) = 0$~~

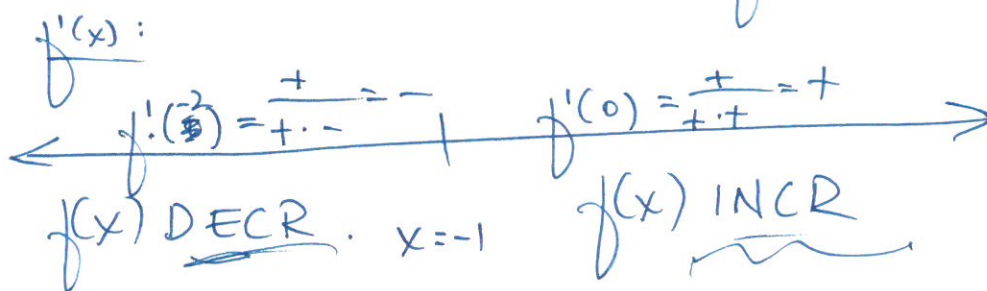
② $f'(x)$ undef

$\frac{2}{3 \cdot \sqrt[3]{x+1}}$ undef.

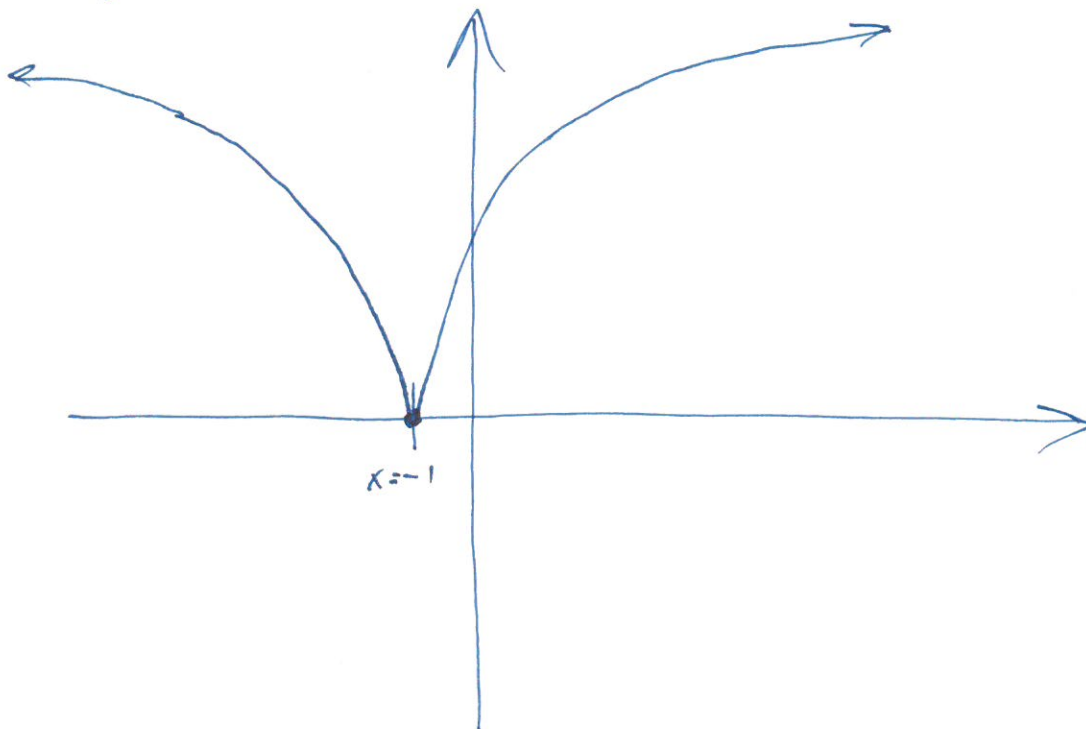
when $x = -1$

$(-1, 0)$
 $f(-1) = 0$

VERTICAL TANGENT LINE HERE



$$f'(x) = \frac{2}{3 \cdot \sqrt[3]{x+1}}$$



$$f''(x) = \frac{2}{3} \left[\frac{-1}{3} \cdot (x+1)^{-4/3} (1) \right] \quad f'(x) = \left(\frac{2}{3} \cdot (x+1)^{-1/3} \right) \quad (7)$$

$$f''(x) = \frac{-2}{9 \left[\sqrt[3]{x+1} \right]^4}$$

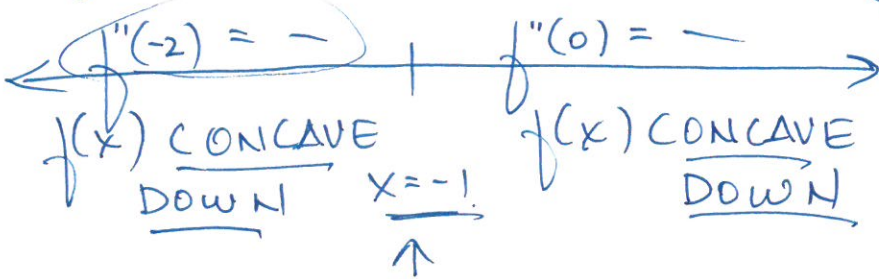
① ~~$f''(x) = 0$~~

② $f''(x)$ undef

$$\frac{-2}{9 \cdot \left[\sqrt[3]{x+1} \right]^4} = f''(x) \quad \begin{matrix} - \\ + \cdot + \end{matrix}$$

when $x = -1$

$f''(x):$



$(-1, 0)$

$f(-1) = 0$

$(-1, 0)$

not a point of inflection
(no change in CONCAV.)

121-001

Quiz #1: Interview; documented with a 1 -2 page paper

- 1.) paper should be typed (word processed), not handwritten
- 2.) Q & A format is OK; paragraph format is OK
- 3.) Interview a person (possibly a parent; not a student) who is currently doing for a living what you would eventually like to do for a living (based on your current major – or desired major)
- 4.) Face-to-face OK; Phone or skype OK; email OK
- 5.) One question you **MUST** ask: How is math used in this career?
- 6.) Other suggested questions you will probably want to ask: Average salary? Stress level? Is it seasonal (lots of work at certain times of the year) or fairly steady? Work/Life balance? Lifestyle/perks? Do you find your job rewarding? Is there continuing education associated with this job? Travel associated with this job? Do you have any summer jobs or internships for college students? Did your degree adequately prepare you for this job? And many, many other questions specific to your interviewee....
- 7.) DUE DATE: **Tuesday, October 9,** at the beginning of class