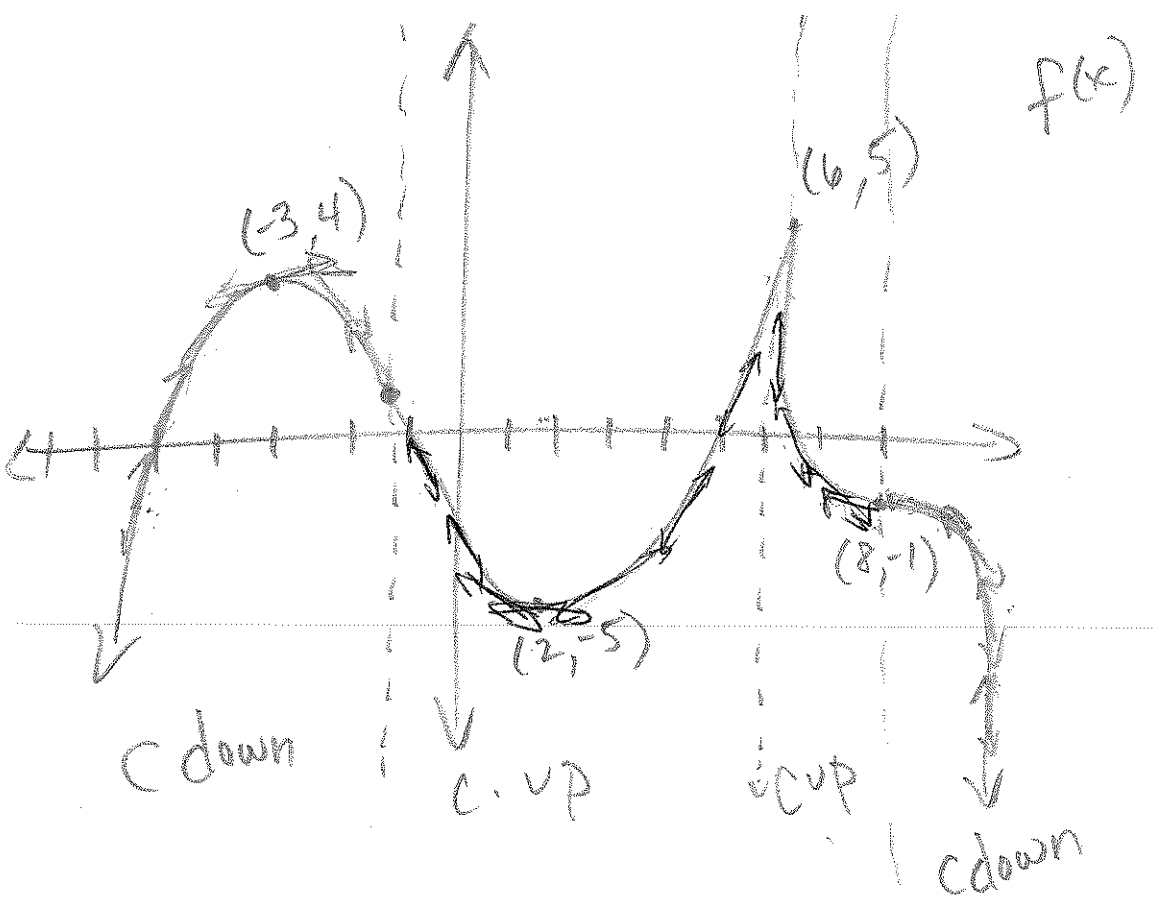


Concave up: "like a cup" ( ) tangents below curve
slopes of tangent = f' increasing
* $f'' > 0$

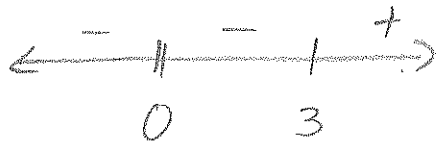
Concave down: "like a frown" ( ) tangents above curve
slope of tangents = f' decreasing
* $f'' < 0$

point of inflection: concavity changes
f' changes incr. to decr OR decr. to incr.
* f' has extrema
f'' changes + to − OR − to +

$f(x) = x^3(x-4) = x^4 - 4x^3$ Determine where $f(x)$ is incr, decr, local extrema, concave up, c down, & poi.

d: $(-\infty, \infty)$

$f'(x) = 4x^3 - 12x^2 = 4x^2(x-3) = 0$



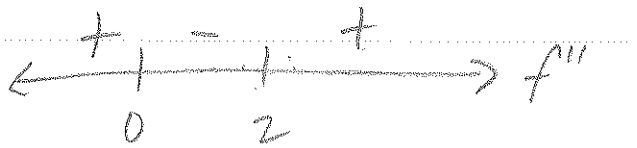
↑: $(3, \infty)$ b/c $f' > 0$

↓: $(-\infty, 0) \cup (0, 3)$ b/c $f' < 0$

l. max: none

local min: $(3, -27)$ b/c f' ch − to +.

$f''(x) = 12x^2 - 24x = 12x(x-2) = 0$



c. up $(-\infty, 0) \cup (2, \infty)$ b/c $f'' > 0$

c down $(0, 2)$ b/c $f'' < 0$

poi: $x = 0$ $(0, 0)$ b/c f'' changes signs

$x = 2$ $(2, -16)$

HWK
Study quiz
P. 189 # 7, 25
11-21 odd,
53-56

$f(x) = x\sqrt{x+2}$ d: $x \geq -2$

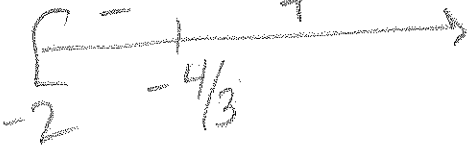
$f'(x) = \sqrt{x+2} + \frac{x}{2\sqrt{x+2}} = \frac{2(x+2)+x}{2\sqrt{x+2}}$

$= \frac{3x+4}{2\sqrt{x+2}}$

↑ $(-\frac{4}{3}, \infty)$ b/c $f' > 0$

↓ $(-2, -\frac{4}{3})$ b/c $f' < 0$

min @ $x = -\frac{4}{3}$ b/c f' ch − to +



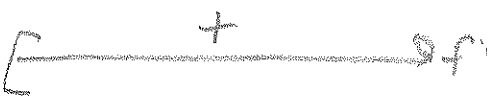
$f''(x) = \frac{3(2\sqrt{x+2}) - \frac{(3x+4)}{\sqrt{x+2}}}{4(x+2)} \cdot \frac{\sqrt{x+2}}{\sqrt{x+2}} = \frac{6(x+2) - (3x+4)}{4(x+2)^{3/2}}$

$= \frac{3x+8}{4(x+2)^{3/2}}$

c up $(-2, \infty)$ b/c $f'' > 0$

never c down

no poi



$x = -8/3$ not in domain