# QUIZ 9

(3 pts)

1) For $f(x) = x^3 - 6x^2 + 4$ find

$64 - 96 + 4$

A) all relative maxs and mins

$$f'(x) = 3x^2 - 12x \overset{\text{SET}}{=} 0$$

$$3x(x-4) = 0 \quad \Rightarrow \quad x = 0, 4$$

| $f'(x)$ | + | | − | | + |
|---|---|---|---|---|---|
| | ← | + | | − | → |
| $x$ | (-1) | 0 | (1) | 4 | (5) |

rel. max: $(0, 4)$

rel. min: $(4, -28)$

B) the absolute max and min on $[-2, 2]$

Check CN $x = 0$ and endpoints:

| $x$ | -2 | 0 | 2 |
|---|---|---|---|
| $f(x)$ | -28 | 4 | -12 |

abs max: $(0, 4)$

abs min: $(-2, -28)$

(2 pts)

2) On what intervals is $y = \frac{1}{4}x^4 + x^3 + \frac{3}{2}x^2$ concave up and concave down?

$$y' = x^3 + 3x^2 + 3x$$

$$y'' = 3x^2 + 6x + 3 \overset{\text{SET}}{=} 0$$

$$3(x^2 + 2x + 1) = 0$$

$$3(x+1)^2 = 0 \quad \Rightarrow \quad x = -1$$

| $f''(x)$ | + | | + |
|---|---|---|---|
| | ← | + | → |
| $x$ | (-2) | -1 | (0) |

$3(-1)^2$ $\qquad$ $3(1)^2$

Concave up: $(-\infty, \infty)$

Concave down: NONE