

U4H2

Find the extrema and tell what type they are.

1. $f(x) = x^2 - 2x + 4$

$$f'(x) = 2x - 2 = 0$$

$$2x = 2$$

$$x = 1$$



absolute min at $(1, 3)$

3. $f(x) = x^3 - 3x^2 + 3x - 2$

$$f'(x) = 3x^2 - 6x + 3 = 0$$

$$x^2 - 2x + 1 = 0$$

$$(x-1)(x-1) = 0$$

$$x = 1$$



no extrema!

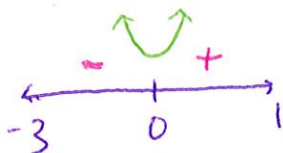
5. $y = x^{2/5}, [-3, 1]$

$$y' = \frac{2}{5} x^{-3/5} = 0$$

$$x^{-3/5} = 0$$

$$\frac{1}{x^{3/5}} = 0$$

$$x = 0$$



absolute min at $(0, 0)$

~~absolute~~ relative max at $(1, 1)$

~~absolute~~ relative max at $(-3, (-3)^{2/5})$

2. $f(x) = \frac{1}{x} + \ln x, 0.5 \leq x \leq 4$

$$f'(x) = -\frac{1}{x^2} + \frac{1}{x} = 0$$

$$-x^2 + x = 0$$

$$-x(x-1) = 0$$

$$x = \cancel{0}, 1$$



not in domain

absolute min at $(1, 1)$

absolute max at $(4, 1.6)$

relative max at $(1/2, 1.3)$

4. $f(x) = \ln(x+1), [0, 3]$

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

$$x = -\cancel{1} \leftarrow \text{not in domain!}$$



absolute min at $(0, 0)$

absolute max at $(3, \ln 4)$

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

$$f'(x) = (x^{2/3}) \cdot 1 + (x+2) \cdot \frac{2}{3} x^{-1/3} = 0$$

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

$$3x^{1/3} \cdot x^{2/3} = \frac{-2x-4}{3x^{1/3}} \cdot 3x^{1/3}$$

$$3x = -2x - 4$$

$$5x = -4$$

$$x = -4/5, 0$$



relative max at $(4/5, 1)$

relative min at $(0, 0)$