

19.  $y = x\sqrt{5-x}$   $x$ -Int:  $x=0, 5$

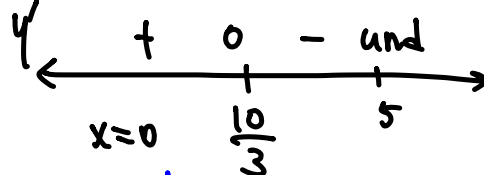
$D: x \leq 5$   $y$ -int:  $y=0$

$$y' = \sqrt{5-x} + x \left( \frac{1}{2} (5-x)^{-\frac{1}{2}} (-1) \right)$$

$$= \sqrt{5-x} - \frac{x}{2\sqrt{5-x}} = \frac{10-2x-x}{2\sqrt{5-x}} = \frac{10-3x}{2\sqrt{5-x}}$$

$$y' = 0 \rightarrow x = \frac{10}{3}$$

$$y' = \text{und} \rightarrow x = 5$$



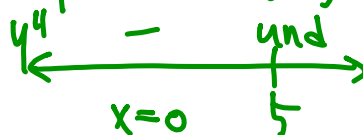
$$y'' = \frac{-3(2\sqrt{5-x}) + (2 \cdot \frac{1}{2} (5-x)^{-\frac{1}{2}} (+1)) (10-3x)}{4(5-x)}$$

$$= \frac{-6\sqrt{5-x} + \frac{10-3x}{\sqrt{5-x}}}{4(5-x)} = \frac{-30+6x+10-3x}{4(5-x)^{3/2}}$$

$$= \frac{-20+3x}{4(5-x)^{3/2}}$$

$$y'' = 0 \rightarrow x = \frac{20}{3}$$

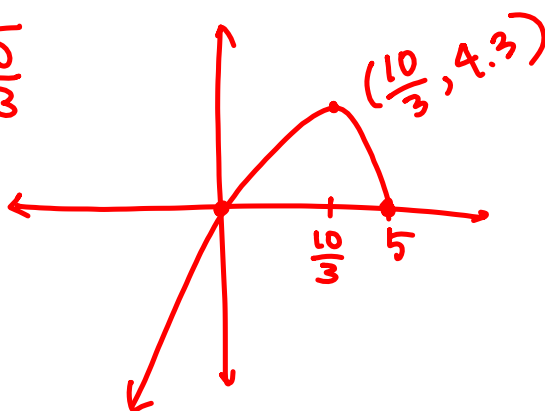
$$y'' = \text{und} \rightarrow x = 5$$



rel max @

$$x = \frac{10}{3}$$

$$y = \frac{10}{3} \sqrt{5 - \frac{10}{3}}$$



rational root thm

$$3. y = 2 - 15x + 9x^2 - x^3 \quad \begin{array}{r} \underline{\underline{2}} \\ -1 \quad 9 \quad -15 \quad 2 \\ \underline{\quad -2 \quad 14 \quad -2} \\ -1 \quad 7 \quad -1 \quad 0 \end{array}$$

x-int:  $x=2, .15$

$-6.85$

$$-(x^2 - 7x + 1) = 0$$

y-int:  $y=2$

$$x = \frac{7 \pm \sqrt{45}}{2} \quad \begin{array}{l} 6.85 \\ .15 \end{array}$$

$$y' = -3x^2 + 18x - 15 \quad y' = 0 \rightarrow x = 1, 5$$

$$= -3(x^2 - 6x + 5) \quad \begin{array}{c} y' \\ - \quad 0 \quad + \quad 0 \quad - \end{array}$$

$$y'' = -6x + 18$$

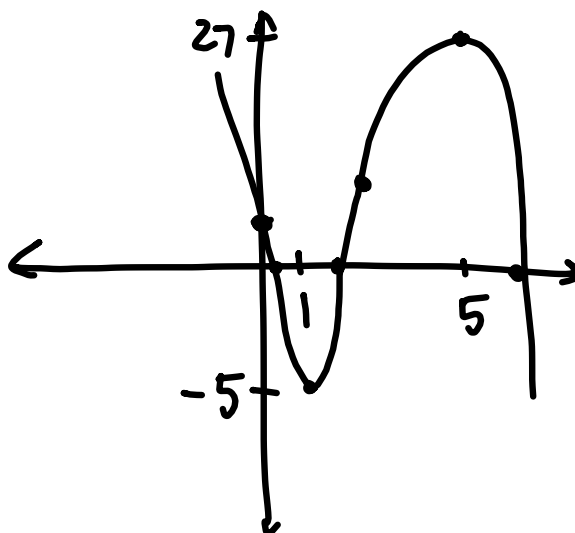
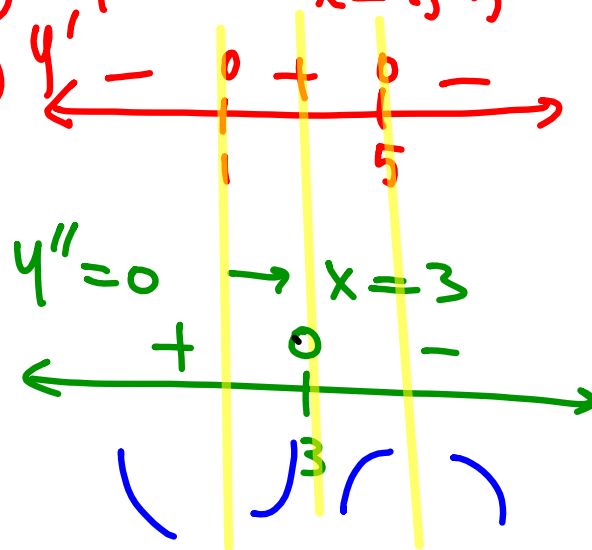
rel. min @  $x=1$

$$y = -5$$

rel. max @  $x=5$

$$y = 27$$

PoI @  $x=3$



$$31. y = 3 \sin x - \sin^3 x \quad [0, 2\pi]$$

$$y' = 3 \cos x - 3 \sin^2 x \cos x = 0$$

$$= 3 \cos x (1 - \sin^2 x)$$

$$= 3 \cos x (1 + \sin x)(1 - \sin x)$$

$$x = \frac{\pi}{2}, \frac{3\pi}{2}$$