201 §3.5 #s 4, 11, 26, 34

(4)

$y = x^4 - 8x^2 + 8 \overset{\text{SET}}{=} 0 \Longrightarrow$

$u^2 - 8u + 8 = 0$

$u^2 - 8u + 4^2 = -8 + 16 = 8$

$(u-4)^2 = 8$

$u - 4 = \pm 2\sqrt{2}$

$u = 4 \pm 2\sqrt{2} = x^2$

$\mathcal{D} = \mathbb{R}$ $\qquad x = \pm\sqrt{4 \pm 2\sqrt{2}}$ all zeros of f,

EVEN

$\approx \pm 2.6131259$,

± 1.0823922

$y' = 4x^3 - 16x$

$= 4x(x^2 - 4) = 4x(x-2)(x+2) \overset{\text{SET}}{=} 0 \Longrightarrow$

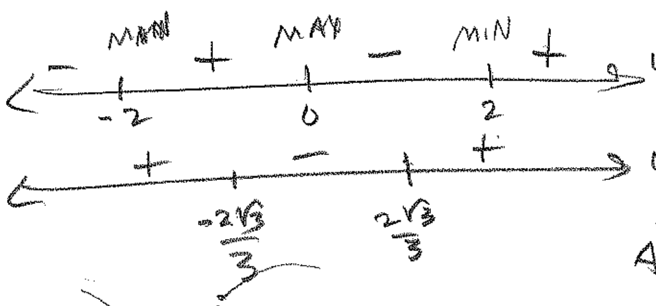
$x \in \{0, \pm 2\}$

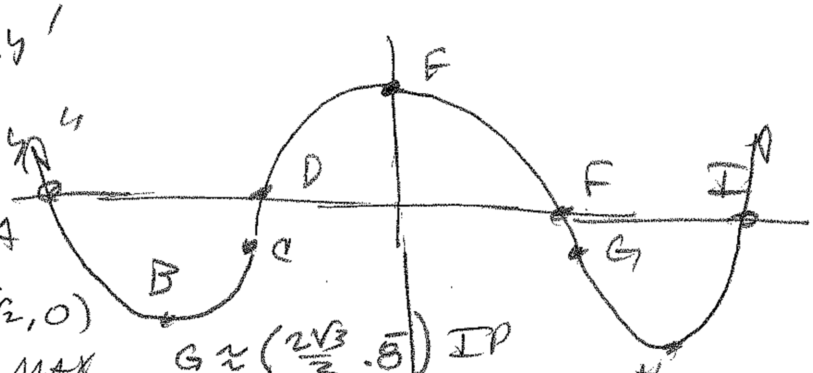
$y'' = 12x^2 - 16 = 4(3x^2 - 4) \overset{\text{SET}}{=} 0 \longrightarrow$

$3x^2 = 4$ $\qquad x \in \{\pm \frac{2\sqrt{3}}{3}\}$

$x^2 = \frac{4}{3}$

$x = \pm\frac{2}{\sqrt{3}} = \pm\frac{2\sqrt{3}}{3} \approx \pm 1.1547$





$A \approx (-\sqrt{4+2\sqrt{2}}, 0)$ $\qquad D = (-\sqrt{4-2\sqrt{2}}, 0)$

$B \approx (-2, -8)$ MIN $\qquad E = (0, 8)$ MAX $\qquad G \approx (\frac{2\sqrt{3}}{3}, .\overline{8})$ IP

$C \approx (-\frac{2\sqrt{3}}{3}, -.\overline{88})$ $\qquad F = (\sqrt{4-2\sqrt{2}}, 0)$ $\qquad H = (2, -8)$ MIN

$I = (\sqrt{4+2\sqrt{2}}, 0)$

201 § 3.5 #s 11, 26, 34

(11) $y = \dfrac{-x^2+x}{x^2-3x+2} = -\dfrac{x^2-x}{x^2-3x+2} = -\dfrac{x(x-1)}{(x-2)(x-1)}$

$D = \mathbb{R} \setminus \{1,2\}$,

$x=2$ is V.A.
$(1,+1)$ is Hole
H.A: $y=-1$

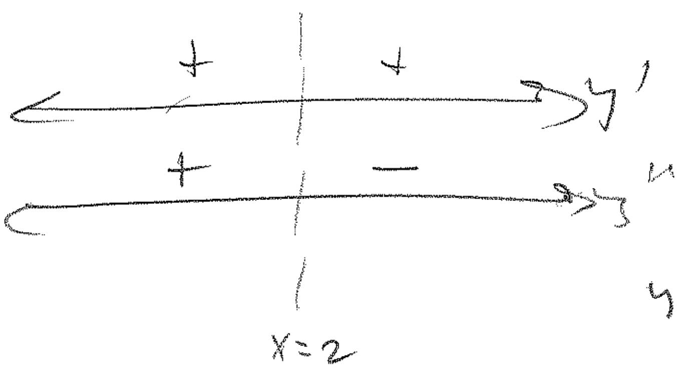
Hole @ (1, 1) Needs labeled on graph, also.

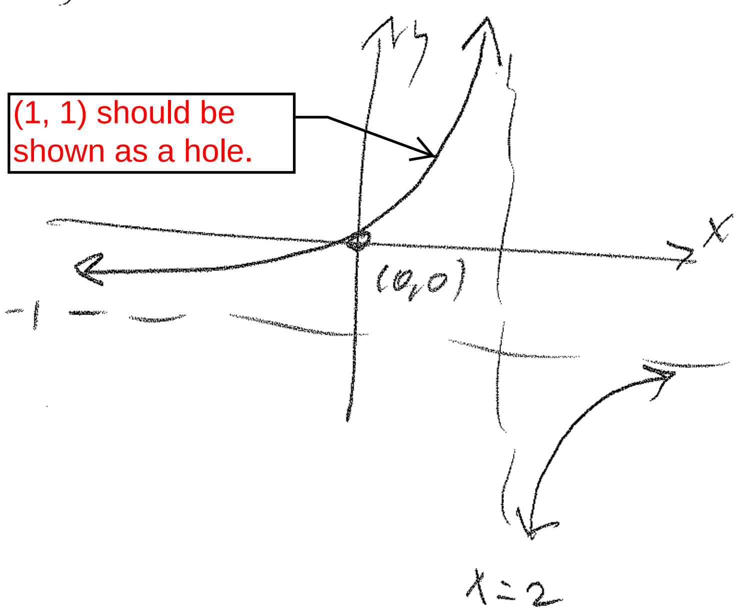
Now, except for the hole, $y = -\dfrac{x}{x-2}$

$$y' = -\left[\frac{1(x-2)-x(1)}{(x-2)^2}\right]$$

$$= -\left[\frac{x-2-x}{(x-2)^2}\right] = \frac{2}{(x-2)^2} = 2(x-2)^{-2}$$

$$y'' = -4(x-2)^{-3} = -\frac{4}{(x-2)^3}$$





201 §3.5 #s 26, 34

$\mathcal{D} = [-\sqrt{2}, \sqrt{2}]$

(26) $y = x\sqrt{2-x^2} \overset{SET}{=} 0 \implies x = 0, \pm\sqrt{2}$

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

$$= \frac{2-x^2}{\sqrt{2-x^2}} - \frac{x^2}{\sqrt{2-x^2}} = \frac{2-2x^2}{\sqrt{2-x^2}} = -\frac{2(x^2-1)}{\sqrt{2-x^2}}$$

$\overset{SET}{=} 0 \implies x = \pm 1$, ~~$\pm\sqrt{2}$~~ $\quad \overset{SET}{\nexists} \implies x = \pm\sqrt{2}$

CVS: $x = \pm 1$

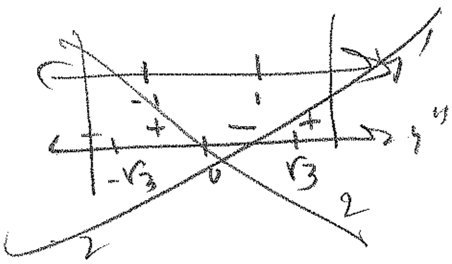
$$y'' = -2\left[\frac{2x(2-x^2)^{\frac{1}{2}} - (x^2-1)\left(\frac{1}{2}\right)(2-x^2)^{-\frac{1}{2}}(-2x)}{2-x^2}\right]$$

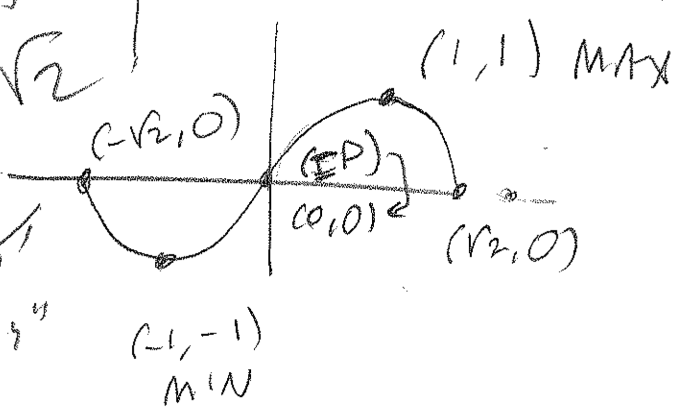
$$= -2\left[\frac{\dfrac{2x(2-x^2)}{\sqrt{2-x^2}} + \dfrac{x(x^2-1)}{\sqrt{2-x^2}}}{2-x^2}\right]$$

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

$$= \frac{2x[x^2-3]}{(2-x^2)^{3/2}} \overset{SET}{=} 0 \longrightarrow x \in \{0, \pm\sqrt{3}\}$$

$\sqrt{3} > \sqrt{2}$!





2 01 §3.5 #34

(34) $y = x + \cos x$ Hard to find zeros analytically

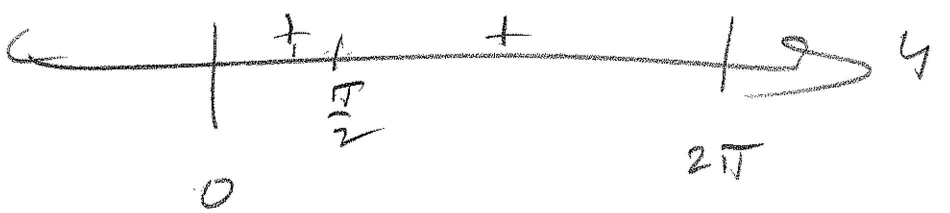
$y' = 1 - \sin x \overset{\text{SET}}{=} 0 \Rightarrow$

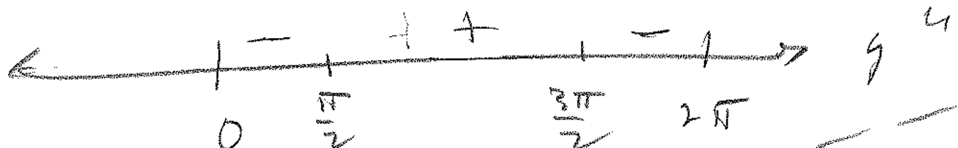
$x = \frac{\pi}{2} + 2n\pi, \ n \in \mathbb{Z}$

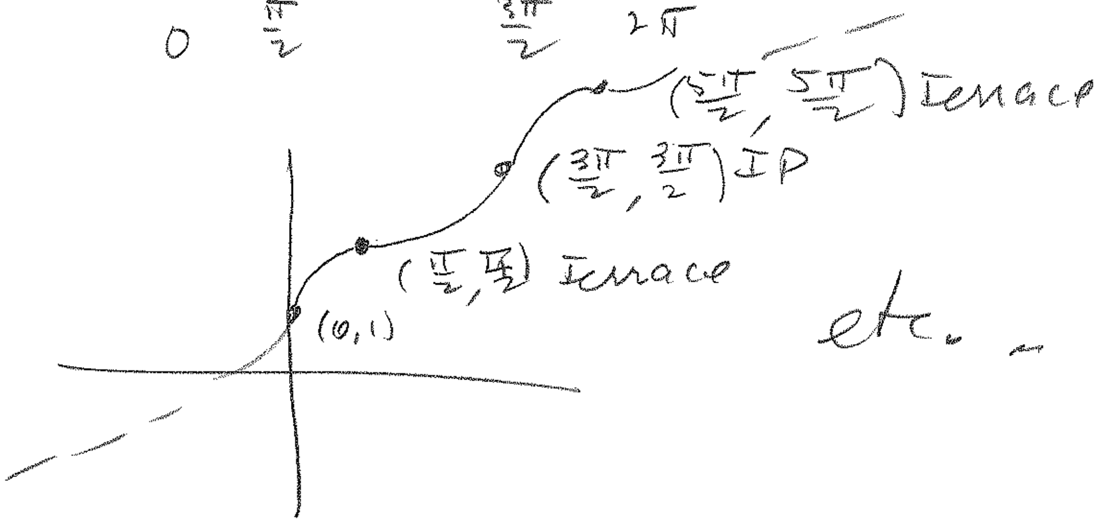
$y'' = -\cos x \overset{\text{SET}}{=} 0$

$x = \frac{(2n+1)\pi}{2}, \ n \in \mathbb{Z}$.

Note: $y' = 1 - \sin x \geq 0 \ \forall x$, so no extremes. Just terraces







etc. ..