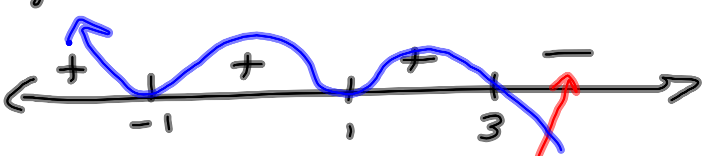
Questions?

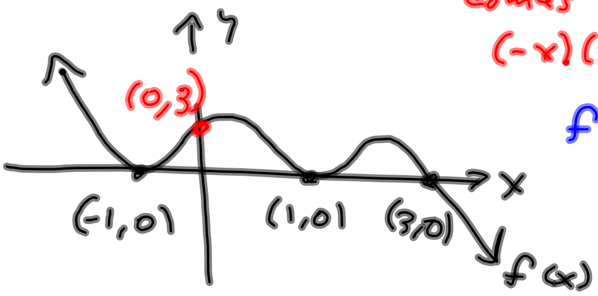
§3.4 #51

$y = (3-x)(x+1)^2(1-x)^4 = f(x)$



comes from

$(-x)(x)^2(-x)^4 = -x^7$ ...



$f(0) = 3(1)^2(1)^4 = 3$

§3.5

#4 $y = x^4 - 8x^2 + 8$

A. $\mathcal{D} = \mathbb{R}$

B. $(0,8)$ is y-int.

$x^4 - 8x^2 + 8 = 0$

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

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

$(u-4)^2 = 8$

$u - 4 = \pm\sqrt{8} = \pm 2\sqrt{2}$

$8 = 2 \cdot 2 \cdot 2$

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

$x = \pm\sqrt{4 \pm 2\sqrt{2}} \rightarrow$

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

$(\sqrt{4-2\sqrt{2}}, 0)$ x-ints.

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

$(-\sqrt{4-2\sqrt{2}}, 0)$

C. Symmetry

f(x) is even. y-axis symmetry

D. No asymptotes.

E. $f'(x) = 4x^3 - 16x \overset{\text{SET}}{=} 0 \Rightarrow 4x(x^2-4) = 4x(x-2)(x+2)$

$= 0 \Rightarrow x = 0, \pm 2.$

f': $-$ on $(-\infty,-2)$, $+$ on $(-2,0)$, $-$ on $(0,2)$, $+$ on $(2,\infty)$

-2: $=0$, min

0: $=0$, max

2: $=0$, min

F. $f(-2) = (-2)^4 - 8(-2)^2 + 8$

$= 16 - 32 + 8$

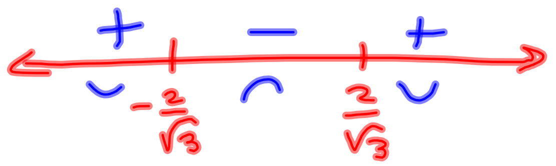
$= -8 \rightsquigarrow (-2,-8)$ MIN

$\longrightarrow (2,-8)$ MIN (by symmetry)

$f(0) = 8 \rightsquigarrow (0,8)$ MAX

G. $f''(x) = 12x^2 - 16 = 4(3x^2 - 4) = 4(\sqrt{3}x - 2)(\sqrt{3}x + 2)$

$a^2 - b^2 = (a-b)(a+b)$

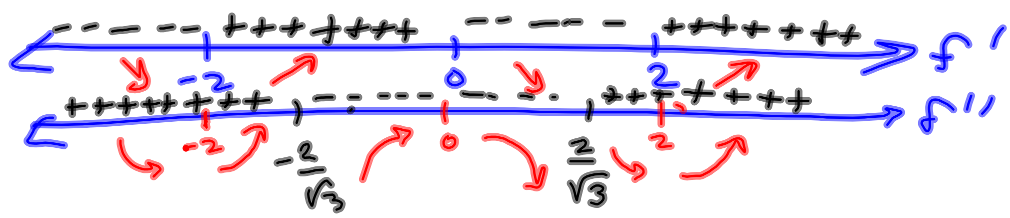


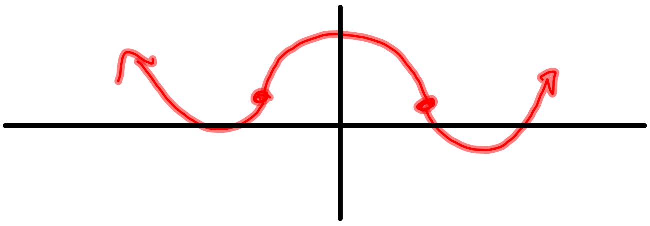
$\sqrt{3}x - 2 = 0$

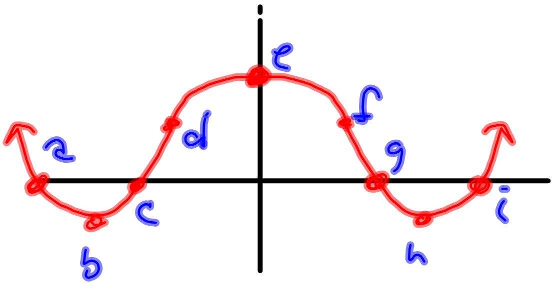
$\sqrt{3}x = 2$

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

I typically would do 1st & 2nd derivative, find cv's & ip's, then do this:







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

$b = (-2, -8)$ MIN

$c = (-\sqrt{4-2\sqrt{2}}, 0)$

$d = (-\frac{2}{\sqrt{3}}, \frac{8}{9})$ IP

$e = (0, 8)$ MAX

$f = (\frac{2}{\sqrt{3}}, 8/9)$ IP.

$g = (\sqrt{4-2\sqrt{2}}, 0)$

$h = (2, -8)$ MIN

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

$$f\left(-\frac{2}{\sqrt{3}}\right) = f\left(\frac{2}{\sqrt{3}}\right)$$

$$= \left(\frac{2}{\sqrt{3}}\right)^4 - 8\left(\frac{2}{\sqrt{3}}\right)^2 + 8$$

$$= \frac{2^4}{(3^{1/2})^4} - 8\left(\frac{2^2}{(3^{1/2})^2}\right) + 8$$

$$= \frac{16}{9} - 8\left(\frac{4}{3}\right) + 8$$

$$= \frac{16}{9} - \frac{32}{3}\cdot\frac{3}{3} + \frac{8}{1}\cdot\frac{9}{9}$$

$$= \frac{16-96+72}{9} = -\frac{8}{9}$$

$$\boxed{\left(\pm\frac{2}{\sqrt{3}}, 8/9\right) \text{ I.P.s}}$$

#11 $y = \frac{-x^2+x}{x^2-3x+2} = \frac{-x\cancel{(x-1)}}{(x-2)\cancel{(x-1)}} = -\frac{x}{x-2}$ $(x \neq 1)$

$\boxed{(1,1) \text{ is hole}}$

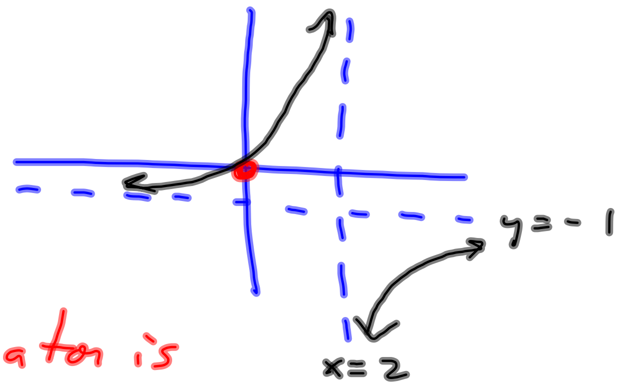
A. $\mathcal{D} = \mathbb{R} \setminus \{1, 2\}$

B. $(0,0)$ is x-y-int.

C. No symmetry

D. V.A.: $x = 2$

H.A.: $y = -1$



Until denominator is of degree > degree of numerator, book recommends dividing.

$$x-2\overline{)\,x+0\,}\quad 1 \text{ r } 2$$
$$-(x-2)$$
$$2$$

$$2\,\rfloor\; 1 \quad 0$$
$$\quad\;\; 2$$
$$1 \quad 2$$
$$c \quad r$$

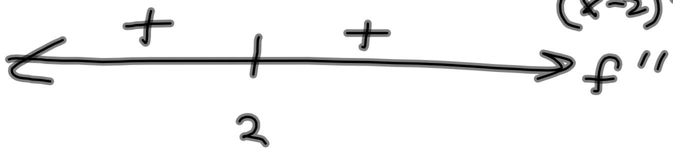
This says $f(x) = 1 + \frac{2}{x-2}$
and book method makes next step easier.

Oops! I just did $\frac{x}{x-2}$. Want $-\frac{x}{x-2}$

So $f(x) = -1 - \frac{2}{x-2}$ Meg's catch.

E $f'(x) = \frac{d}{dx}\left[-1 - 2(x-2)^{-1}\right] = -2(-1)(x-2)^{-2}$

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



F. No extremes

G. $f''(x) = -4(x-2)^{-3} = -\frac{4}{(x-2)^3}$

H. See College Algebra graph I did @ the start. All we need on this one.

Oct 10-12:58 PM

#26 $y = x\sqrt{-x^2+2}$

#34 $y = x + \cos x$