3.3 – HW Solutions #'s 2, 23, 25, 49

2.) $\dfrac{3x^3-6x^2+3x-4}{x^2-1}$ → $x^2+0x-1 \;\big|\; 3x^3-6x^2+3x-4$

$3x-6$ → quotient

$-(3x^3+0x^2-3x)$ ↓

$-6x^2+6x-4$

$-(-6x^2+0x+6)$

$6x-10$ ← remainder

23.) Domain is all real #'s except where there are any vertical asymptotes. There is a VA @ $x=2$

↳ $D: \{x \mid x \neq 2\}$

b.) intercepts (x-int and/or y-int): both x-int & y-int occur at (0,0)

c.) Horizontal asymptotes: List the equations for any horizontal DASHED lines. → $\boxed{y=1}$

d.) Vertical asymptotes: List the equations for any vertical DASHED lines. → $\boxed{x=2}$

e.) Oblique asymptotes: Give the equation for any Angled DASHED lines. → There aren't any

<over>

25.) a.) D: $\{x \mid x \neq 0\}$ b/c there is a VA @ $x = 0$

b.) x-int's → $(-1, 0)$ & $(1, 0)$; y-int's → none

c.) HA → none

d.) VA → $x = 0$

e.) Oblique Asymptote (OA)

- Find the equation of the angled dashed line.

↳ $m = 2$, $b = 0$

$$\boxed{y = 2x}$$

*OA will always be in $y = ax + b$ Form

49.) $P(x) = \dfrac{3x^4 + 4}{x^3 + 3x}$ $\xrightarrow{\text{Factored Form}}$ $R(x) = \dfrac{3x^4 + 4}{x(x^2 + 3)}$

VA → cancel any common factors, then set remaining denominators equal to zero & solve. (hint: only list real values, not complex values)

$\boxed{x = 0}$ $\quad x^2 + 3 = 0 \Rightarrow x^2 = -3 \rightarrow x = \pm i\sqrt{3}$

↓ not a real value, so not a VA.

HA → [NONE], this function will instead have an oblique asymptote b/c $n = m + 1$

OA → Divide denom. into num., and the quotient will be the oblique Asymptote.

$(3x) \rightarrow$ OA

$x^3 + 0x^2 + 3x + 0 \;\big|\; 3x^4 + 0x^3 + 0x^2 + 0x + 4$

$-\,3x^4 + 0x^3 + 9x^2 + 0x$

$-9x^2 + 0x + 4$

$$\boxed{y = 3x}$$