

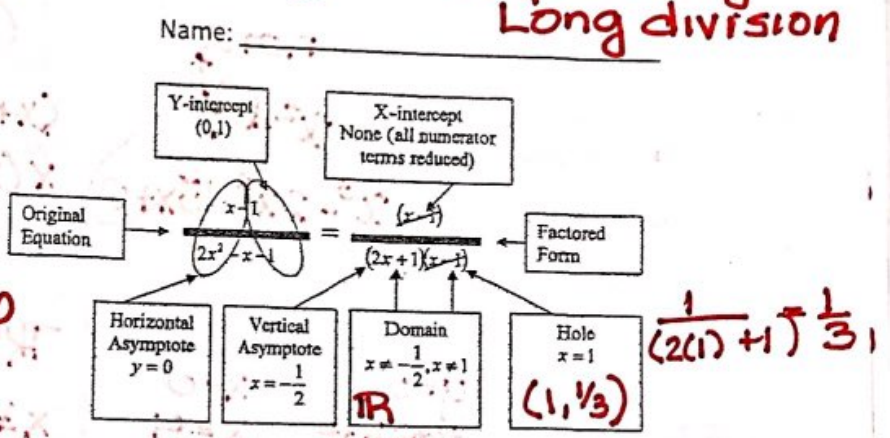
oblique
 pp - demo
 olw
 au

Graphs Notes

deg num < deg denom $y=0$
 deg num = deg denom : coeff as frac
 deg num > deg denom by exactly 1
 Long division

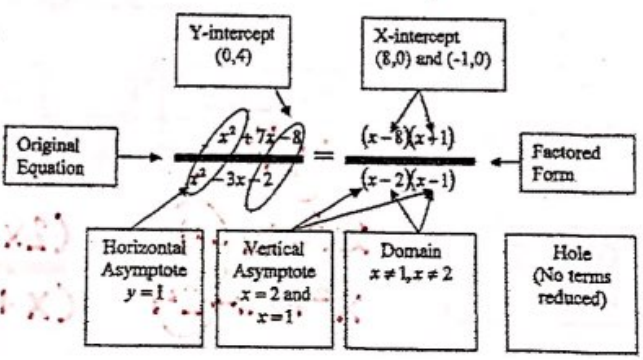
Characteristics that can be found from the original equation:

- Y-intercept
- horiz. asymp
- oblique asymp



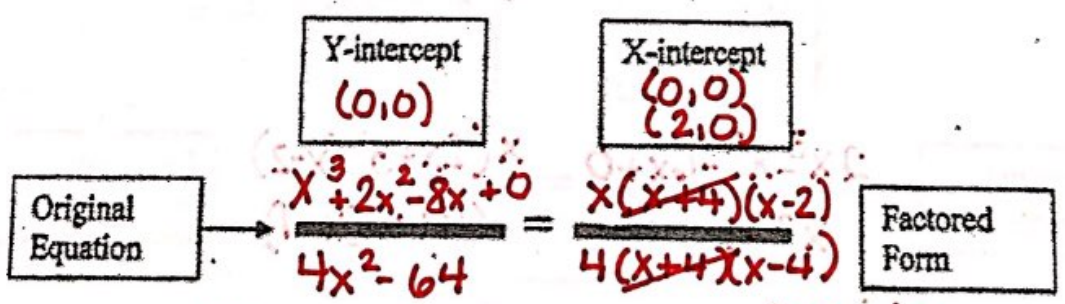
Characteristics that can be found from the factored form:

- X-intercept
- Vertical Asym
- holes
- domain



Characteristics that are found from a sketch of the graph:

- range
- Max/min
- increasing/decreasing intervals



oblique

Horizontal Asymptote: $y = \frac{1}{4}x + \frac{1}{2}$

Vertical Asymptote: $x=4$

Domain: $\mathbb{R}: x \neq \pm 4$

Hole: $(4, \frac{3}{4})$

Handwritten calculations:

$$64 \overline{) x^3 + 2x^2 - 8x}$$

$$\underline{x^3 - 16x}$$

$$2x^2 + 8x$$

$$\frac{-4(4-2)}{4(-4^2-4)}$$

$$\frac{-4(-6) = 24}{4(-8) = -32}$$

Original Equation $\rightarrow \frac{x^2 - 9}{x^3 - 2x^2 - 15x + 0} = \frac{(x+3)(x-3)}{x(x-5)(x+3)}$ Factored Form

Y-intercept: none
 X-intercept: (3, 0)
 Horizontal Asymptote: $y=0$ (top < bot)
 Vertical Asymptote: $x=0$, $x=5$
 Domain: \mathbb{R} , $x \neq 0$, $x \neq 5$, $x \neq -3$
 Hole: $(-3, -\frac{1}{4})$ $\frac{-3-3}{-3(-3-5)} = \frac{-6}{-3(-8)} = \frac{-6}{24} = -\frac{1}{4}$

Original Equation $\rightarrow \frac{2x^2 - 7x - 4}{x^2 + 2x - 24} = \frac{(2x+1)(x-4)}{(x+6)(x-4)}$ Factored Form

Y-intercept: (0, $\frac{1}{6}$)
 X-intercept:
 Horizontal Asymptote: top = bot, $y=2$
 Vertical Asymptote: $x=-6$
 Domain: \mathbb{R} , $x \neq -6$, $x \neq 4$
 Hole: $(4, \frac{9}{10})$ $\frac{2(4)+1}{4+6} = \frac{9}{10}$

Original Equation $\rightarrow \frac{2x^3 - x^2 - 6x + 0}{x^2 - 1} = \frac{x(2x+3)(x-2)}{(x+1)(x-1)}$ Factored Form

Y-intercept:
 X-intercept:
 Horizontal Asymptote: oblique, top > bot, $y=2x-1$
 Vertical Asymptote: $x=1$, $x=-1$
 Domain: \mathbb{R} , $x \neq -1$, $x \neq 1$
 Hole: none

Long division for oblique asymptote:

$$\begin{array}{r} 2x-1 \\ 2x^3-x^2-6x \dots \\ -2x^3 \dots + 2x \dots \\ \hline -x^2-4x \dots \end{array}$$

Find any holes existing in the following functions. Find all asymptotes.

$$1. f(y) = \frac{y^2 - 16}{y^2 - 7y + 12}$$

$$2. f(x) = \frac{2x^2 + 11x + 5}{3x^2 + 17x + 10}$$

$$3. f(x) = \frac{3x^2 - 3}{6x^2 + 12x + 6}$$

$$4. f(x) = \frac{-15 - x + 6x^2}{3x^2 + 4x - 15}$$

$$5. f(x) = \frac{54 - 6x - 4x^2}{4x^2 - 81}$$

$$6. f(x) = \frac{6x^2 + x + 12}{3x^2 - 5x - 2}$$

$$7. f(x) = \frac{x^2 + 3x}{x^3 + 2x^2 + x}$$