

Do Now

① Does the graph of $y = \frac{x^2 - x - 2}{x - 1}$ cross over its horizontal or oblique asymptote?
Is this function even, odd or neither?

$$y = \frac{x^2 + x - 2}{-x - 1}$$

neither

$$\begin{array}{r} 1 \quad 1 \quad -1 \quad -2 \\ \hline 1 \quad 0 \quad 0 \\ \hline \end{array} \text{ remainder } -2$$

$$\text{OA: } y = x$$

cross? $\frac{x^2 - x - 2}{x - 1} = x$ no

$$\cancel{x^2} - \cancel{x} - 2 = \cancel{x^2} - \cancel{x} - 2$$

$-2 \neq 0$

② Write an equation for the cubic polynomial that is tangent to the x-axis at $x = 2$, has a zero of $x = -1$ and passes through $(3, 5)$.

$$y = a(x - 2)^2(x + 1)$$

$$5 = a(3 - 2)^2(3 + 1)$$

$$5 = 4a$$

$$a = \frac{5}{4}$$

$$y = \frac{5}{4}(x - 2)^2(x + 1)$$

③ Sketch the graph of $y = \frac{x^2 + x}{x^2 - 4} = \frac{x(x+1)}{(x+2)(x-2)}$

no holes

VA: $x = \pm 2$

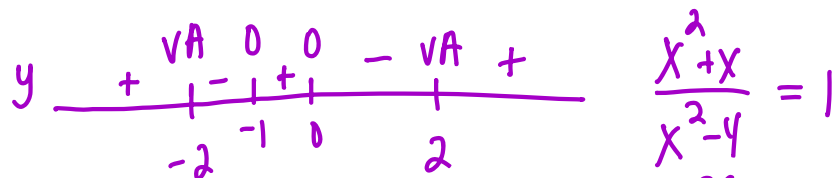
HA: $y = 1$

Cross? $(-4, 1)$

X-int: $(0, 0), (-1, 0)$

y-int: $(0, 0)$

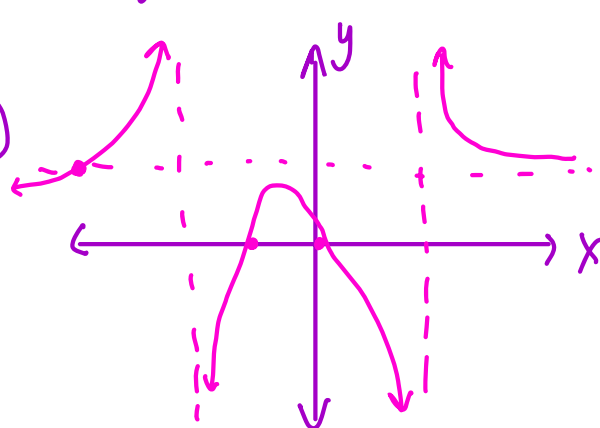
neither



$$\frac{x^2 + x}{x^2 - 4} = 1$$

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

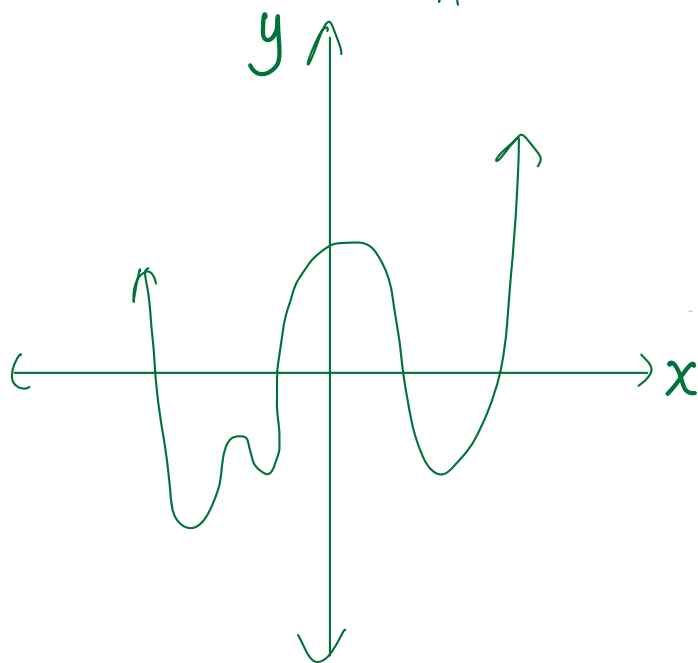
$$x = -4$$



$$D: \{x \mid x \neq \pm 2\}$$

④ How many real roots (include multiplicities) and how many non real roots does the function have?

$n = 6$



4 real roots

2 non real roots

⑤ Determine if the following functions are even, odd, or neither.

$$A) y = \frac{x^8 + x^6}{x^3 + x}$$

$$y(-x) = \frac{x^8 + x^6}{-x^3 - x} \quad \text{ODD}$$

$$B) y = \frac{x^7 + x^4}{x^3 + 2x}$$

$$y(-x) = \frac{-x^7 + x^4}{-x^3 - 2x} \quad \text{neither}$$

$$C) y = \frac{x^5 - x^7}{x^3 - x^9}$$

$$y(-x) = \frac{-x^5 + x^7}{-x^3 + x^9} + (x^5 - x^7) \quad \text{even}$$

⑥ Sketch the graph of $y = \frac{-6+5x-x^2}{x^3-4x^2+x+6} = \frac{-x^2+5x-6}{x^3-4x^2+x+6}$

$$\begin{array}{r|rrrr} 3 & 1 & -4 & 1 & 6 \\ & & 3 & -3 & -6 \\ \hline & 1 & -1 & -2 & 0 \end{array}$$

$$x^2 - x - 2$$

$$y = \frac{-(x^2 - 5x + 6)}{x^3 - 4x^2 + x + 6} = \frac{-(x-3)(x-2)}{(x-3)(x-2)(x+1)}$$

$$y = \frac{-1}{x+1}$$

holes: $(3, -\frac{1}{4}), (2, -\frac{1}{3})$

VA: $x = -1$

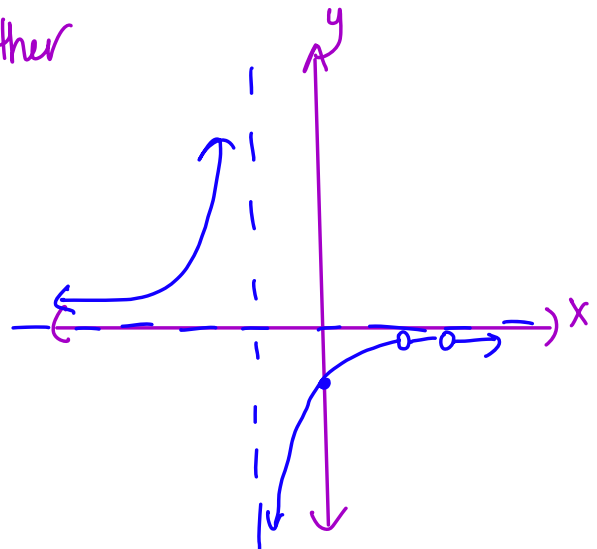
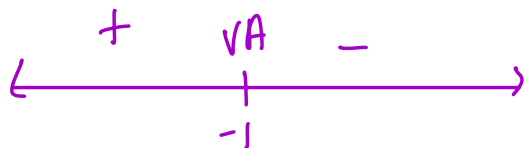
HA: $y = 0$

cross: no

x-int: none

y-int: $(0, -1)$

neither



$$D: \{x \mid x \neq -1, 2, 3\}$$

$$R: \{y \mid y \neq -\frac{1}{3}, -\frac{1}{4}, 0\}$$

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