

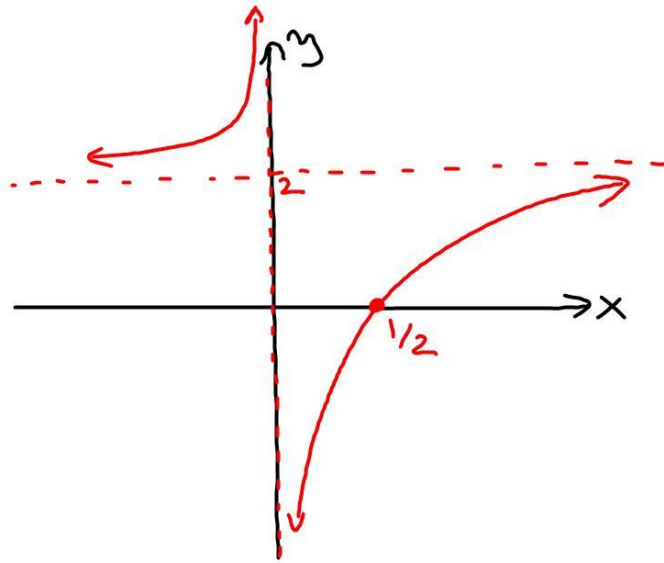
5.3 Graphs of Rational Function of the Form $f(x) = \frac{ax+b}{cx+d}$

<p>A Characteristics of the Rational Function:</p> $f(x) = \frac{ax+b}{cx+d} \quad a, c \neq 0$ <p>Case 1. $cx+d$ is not a factor of $ax+b$</p> <p>Domain: $R \setminus \{-d/c\}$ Range: $R \setminus \{a/c\}$ (set of all y numbers) x-intercept: $-b/a$ y-intercept: b/d if $d \neq 0$ Symmetry: neither even nor odd Vertical asymptote: $x = -d/c$ Horizontal asymptote: $y = a/c$ Continuity: There exists an infinite break at $x = -d/c$.</p>	<p>Ex 1. Find the characteristics of the function $f(x) = \frac{2x-4}{x+2}$. Then graph it. $x \neq -2$</p> <p>$= \frac{2(x-2)}{x+2}$</p> <p>Zero: $x=2$ VA: $x=-2$ y-int: -2 HA: $y=2$</p>
<p>B Characteristics of the Rational Function:</p> $f(x) = \frac{ax+b}{cx+d} \quad a, c \neq 0$ <p>Case 2. $cx+d$ is a factor of $ax+b$</p>	<p>Ex 2. Find the characteristics of the function $f(x) = \frac{x+6}{2x+4}$. Then graph it.</p>

<p>B Characteristics of the Rational Function:</p> $f(x) = \frac{ax+b}{cx+d} \quad a, c \neq 0$ <p>Case 2. $cx+d$ is a factor of $ax+b$</p> <p>Domain: $R \setminus \{-d/c\}$ $D = R \setminus \{-2\}$ Range: $\{a/c\}$ $R = \{3/2\}$ x-intercept: none \checkmark y-intercept: b/d if $d \neq 0$ $y_{int} = 3/2$ Symmetry: neither even nor odd \checkmark Vertical asymptote: none \checkmark Horizontal asymptote: $y = a/c$ $HA: y = 3/2$ Continuity: There exists a hole at $x = -d/c$ $Hole: (-2, 3/2)$</p>	<p>Ex 2. Find the characteristics of the function $f(x) = \frac{3x+6}{2x+4}$. Then graph it. $x \neq -2$</p> <p>$= \frac{3(x+2)}{2(x+2)} = \frac{3}{2}$</p> <p>Hole: $(-2, 3/2)$</p>
<p>Ex 3. Graph the function: $f(x) = 2 - 1/x$.</p>	<p>Ex 4. Find a function of the form $f(x) = \frac{ax+b}{cx+d}$ with a horizontal asymptote $y = 2$, a vertical asymptote $x = 1$ and an x-intercept $x_{int} = -1$. Then graph it.</p>

③

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



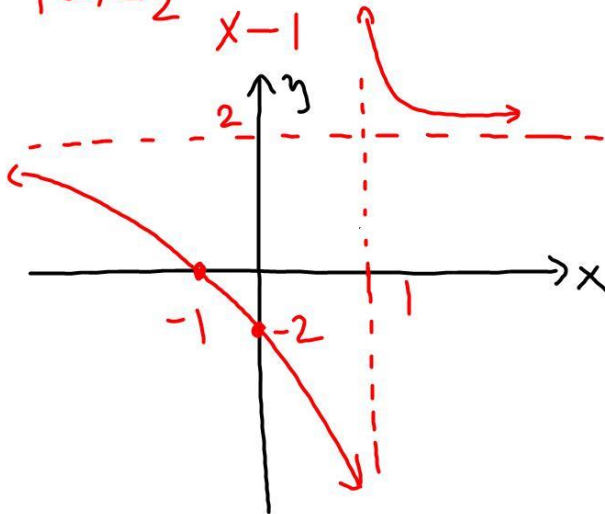
④

HA: $y=2$

VA: $x=1$

x-int = -1

$$f(x) = 2 \frac{x+1}{x-1}$$

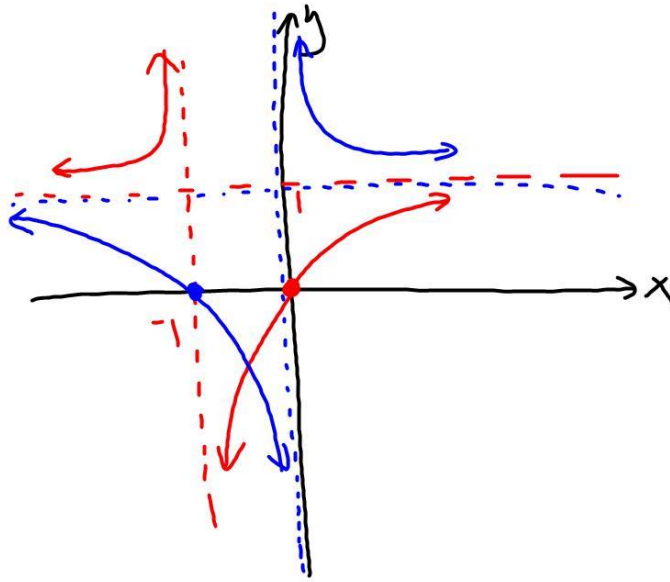


⑤

$$f(x) = \frac{x}{x+1}$$

$$g(x) = \frac{1}{f(x)}$$

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



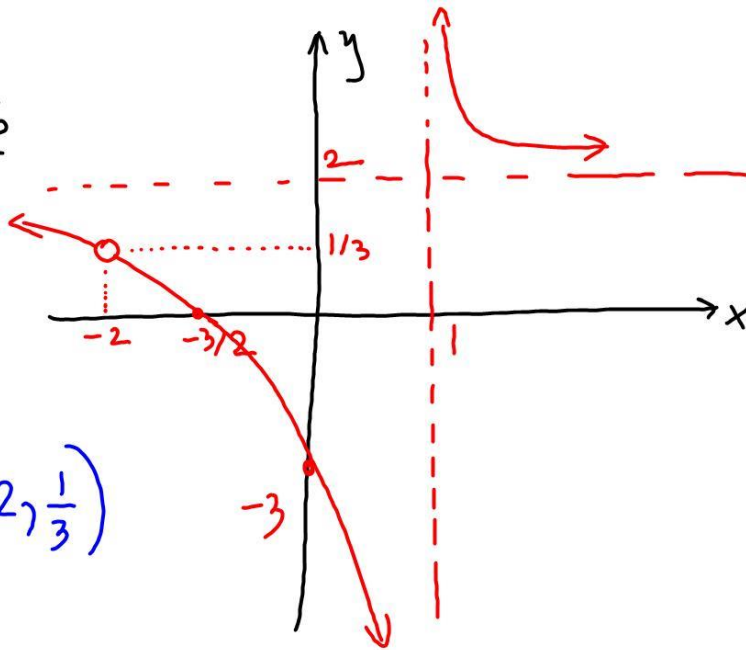
⑥

$$f(x) = \frac{2x^2 + 7x + 6}{x^2 + x - 2}$$

$$= \frac{(2x+3)(x+2)}{(x+2)(x-1)}$$

$$= \frac{2x+3}{x-1}$$

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

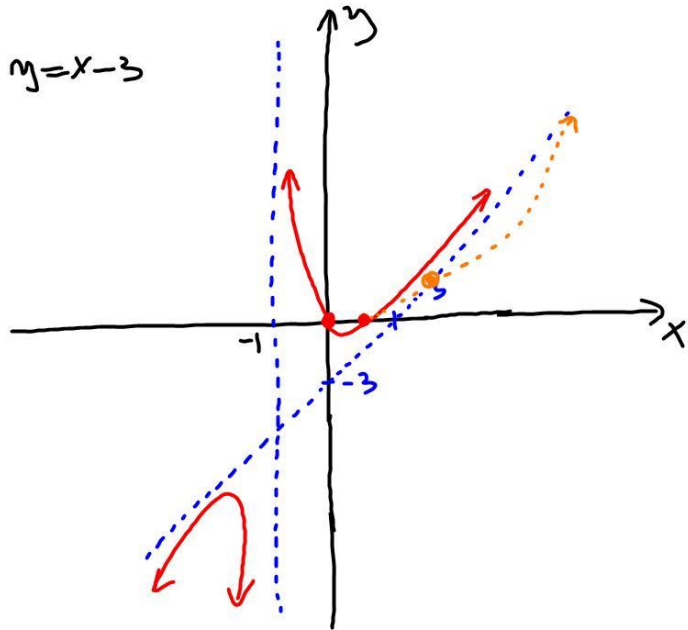


7c

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

$$\begin{array}{r} x+1 \overline{) \begin{array}{r} x^2 - 2x \\ x^2 + x \\ \hline -3x - 3 \\ \hline 3 \end{array} } \end{array}$$

OA: $y = x - 3$

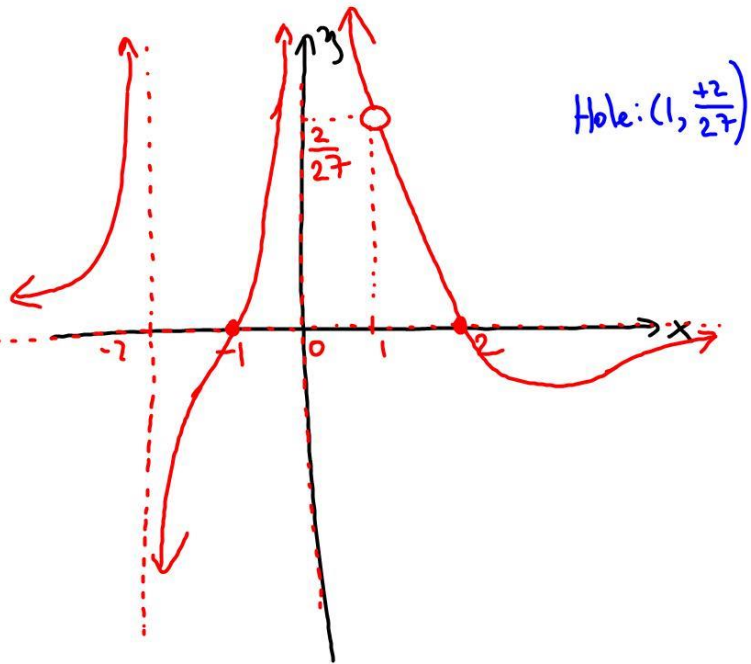


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$$f(x) = \frac{(-x)(x-2)}{x^2(x+2)^2(x^2+x-2)}$$

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

$$= -\frac{(x+1)(x-2)}{x^2(x+2)^3}$$



Hole: $(1, \frac{2}{27})$

