④ a) $f(x) = \dfrac{x^2-5x-6}{x+1} = \dfrac{(x-6)\cancel{(x+1)}}{\cancel{(x+1)}} = x-6$

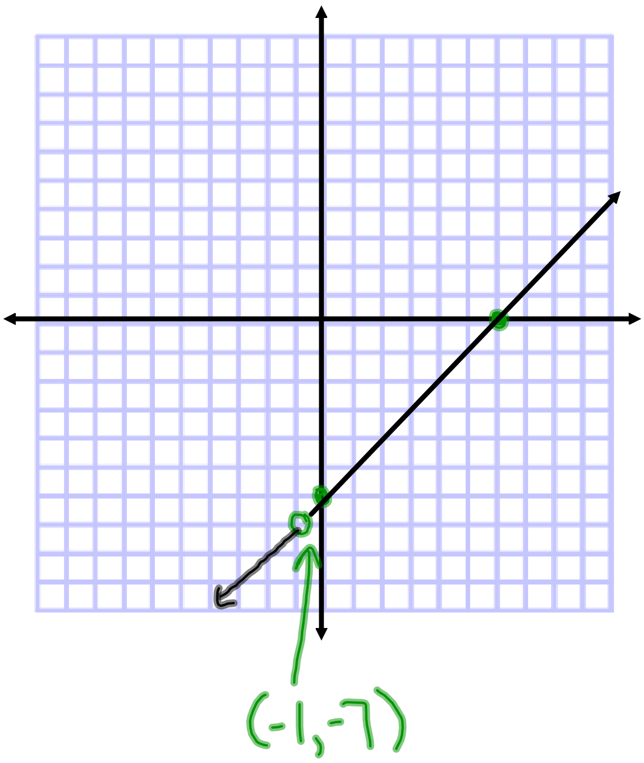
① Roots: $x=6$

② V.A.: None

③ O.A.: $y=x-6$

④ Holes: $x=-1$

⑤ y int: $y=-6$



④ b) $f(x) = \dfrac{x^2-2x-3}{x^2+6x+8} = \dfrac{(x-3)(x+1)}{(x+2)(x+4)}$

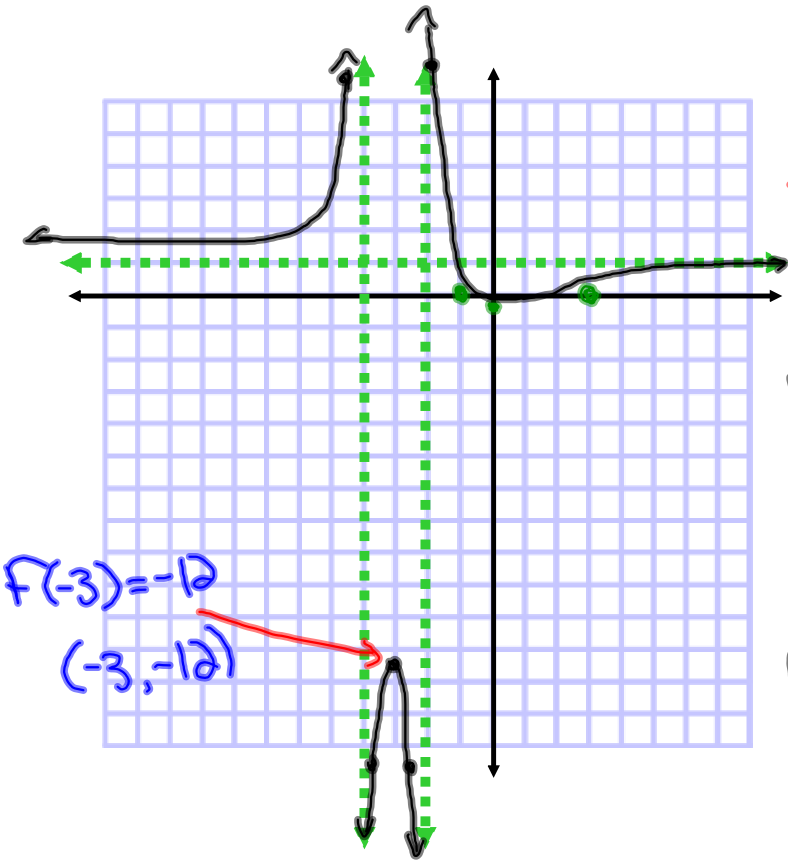
① roots $x=-1,3$

② V.A. $x=-4,-2$

③ H.A. $y=1$

④ Holes: None

⑤ y-int $y=-3/8$



Check Behaviour near V.A.

$x=-4$

$\lim_{x\to -4^-} f(x) = +\infty$

$\lim_{x\to -4^+} f(x) = -\infty$

$x=-2$

$\lim_{x\to -2^-} f(x) = -\infty$

$\lim_{x\to -2^+} f(x) = +\infty$

④ c) $f(x) = \dfrac{x^2-4}{x^2-9} = \dfrac{(x+2)(x-2)}{(x+3)(x-3)}$

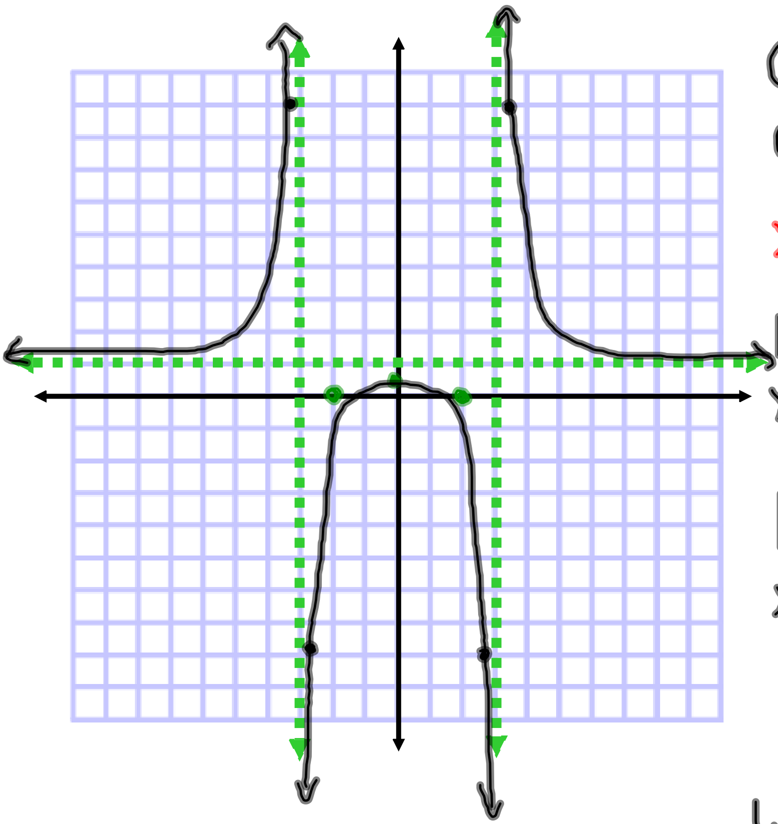
① Roots: $x = \pm 2$

② V.A. $x = \pm 3$

③ H.A. $y = 1$

④ Holes: None

⑤ y int $y = 4/9$



Check the behaviour near the V.A.

$x = -3$

$\lim_{x \to -3^-} f(x) = +\infty$

$\lim_{x \to -3^+} f(x) = -\infty$

$x = 3$

$\lim_{x \to 3^-} f(x) = -\infty$

$\lim_{x \to 3^+} f(x) = +\infty$

① d)

$$\frac{\frac{2}{x}+\frac{3}{xy}}{\frac{2}{xy}+\frac{3}{y}} \to \frac{\frac{2y+3}{xy}}{\frac{2+3x}{xy}} \to \frac{2y+3}{\cancel{xy}} \cdot \frac{\cancel{xy}}{2+3x} \to$$

$$\frac{2y+3}{2+3x}$$

$x \neq 0, -\frac{2}{3}$

$y \neq 0$

② c)

$$\left(\sqrt{3x+15}\right)^2 = \left(1+\sqrt{18+x}\right)^2$$

$$3x+15 = 19+x+2\sqrt{18+x}$$

$$2x-4 = 2\sqrt{18+x}$$

$$\frac{\cancel{2}(x-2)}{\cancel{2}} = \frac{\cancel{2}\sqrt{18+x}}{\cancel{2}}$$

$$(x-2)^2 = \left(\sqrt{18+x}\right)^2$$

$$x^2-4x+4 = 18+x$$

$$x^2-5x-14=0$$

$$(x-7)(x+2)=0$$

$x-7=0$	$x+2=0$
$x=7$	$x=-2$

(2) e) $|2x-7| \geq 15$

$2x-7 \geq 15$

$2x \geq 22$

$\boxed{x \geq 11}$

$2x-7 \leq -15$

$2x \leq -8$

$\boxed{x \leq -4}$

④ b) $f(x) = \dfrac{1x^2 - 2x - 3}{1x^2 + 6x + 8} = \dfrac{(x-3)(x+1)}{(x+4)(x+2)}$

① Roots:
$x = -1, 3$
$(-1,0) + (3,0)$

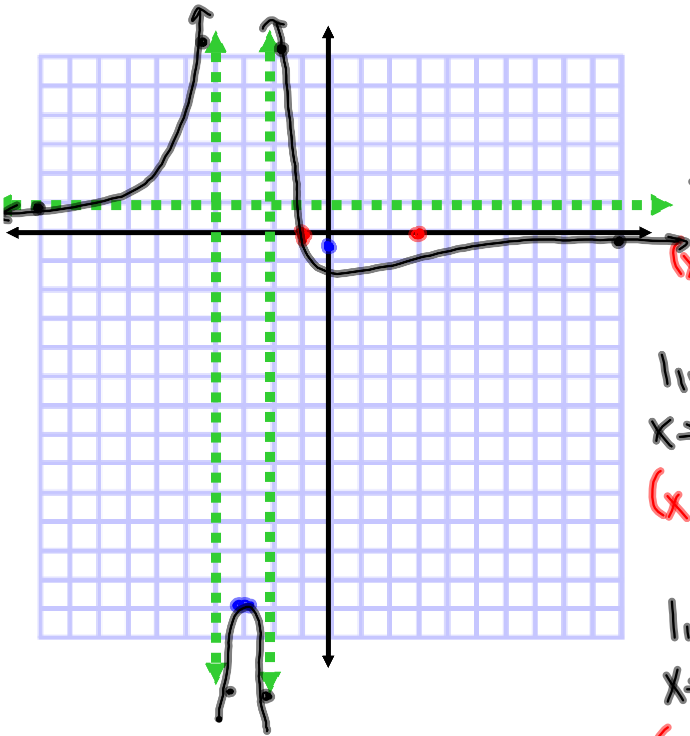
② y int:
$y = \dfrac{-3}{8}$
$(0, -3/8)$

③ VA:
$x = -4, -2$

④ HA:
$y = 1$

⑤ Holes:
None

Check behaviour near the VA:



$f(-3) = \dfrac{(-6)(-2)}{(1)(-1)} = -12$

$\lim_{x \to -4^-} \dfrac{(-)(-)}{(-)(-)} = +\infty$

$(x = -4.01)$

$\lim_{x \to -4^+} \dfrac{(-)(-)}{(+)(-)} = -\infty$

$(x = -3.99)$

$\lim_{x \to -2^-} \dfrac{(-)(-)}{(+)(-)} = -\infty$

$(x = -2.01)$

$\lim_{x \to -2^+} \dfrac{(-)(-)}{(+)(+)} = +\infty$

$(x = -1.99)$

② 5) $12 > |x-5| > -8$

$12 > x-5 > -8$

$17 > x > -3$

$-3 < x < 17$

$12 > -(x-5) > -8$

$12 > -x+5 > -8$

$7 > -x > -13$

$\boxed{-7 < x < 13}$

$-12 < x-5 < 8$

$\boxed{-7 < x < 13}$