Finding The Domain of A Function

1) $\frac{\quad}{0}$ BAD

2) $\sqrt{-*}$ BAD

$f(x) = \frac{1}{x-2}$ → $x - 2 = 0$

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

$\boxed{x = 2}$ Dividing By 0 is Undefined

$\boxed{\text{Domain: } (-\infty, 2) \ (2, \infty) \text{ exclusive}}$

$f(x) = \frac{1}{x^2 - x - 6}$ → $x^2 - x - 6 = 0$

↓

$(x+2)(x-3) = 0$

$3 \cdot 2 = 6$

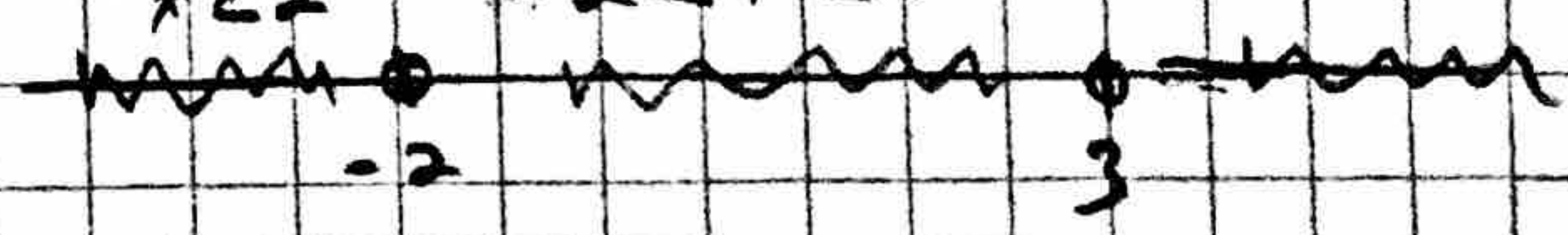
$3 - 2 = 1$

$\boxed{2 - 3 = -1}$

$x + 2 = 0$ $\qquad$ $x - 3 = 0$

$-2 \ \ -2$ $\qquad$ $+3 \ \ +3$

$\boxed{x = -2}$ $\qquad$ $\boxed{x = 3}$



$\boxed{\text{Domain: } (-\infty, -2) \ (-2, 3) \ (3, \infty)}$

$f(x) = \frac{\sqrt{x-1}}{x^2+4}$ → No Restriction if Plugging in negative and positive values

$x - 1 \geq 0$

$\quad +1 \quad\ +1$

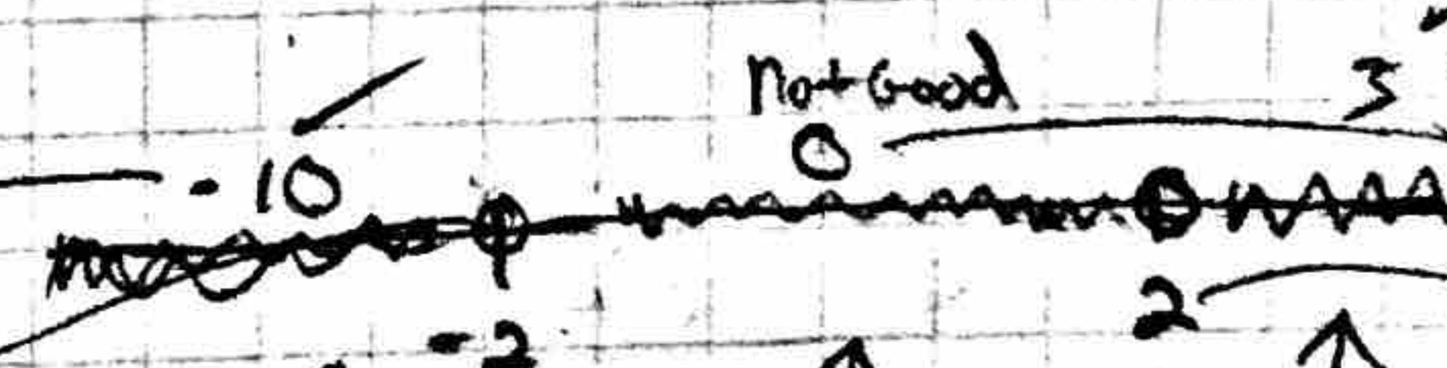
$\boxed{x \geq 1}$

$\boxed{\text{Domain } [1, \infty)}$

$f(x) = \frac{1}{\sqrt{x^2-4}}$ Requirement has to be greater than 0 and not negative.

$x^2 - 4 > 0$

$(x+2)(x-2) > 0$



check a number from each of the 3 intervals to see if they satisfy the equation

$\boxed{\text{Domain: } (-\infty, 2)\ (2, \infty)}$

$0 > 0$ FALSE

$(-2+2)(-2-2)$

$(0)\quad(-4) = 0$

$(2+2)(2-2)$

$(4)\ (0) = 0$

$(3+2)(3-2)$

$(5)\ (1)$

$=$

6

$(-10+2)(-10-2)$ Positive # is good

$(-8)\quad(-12) = 96$

$(0+2)(0-2)$

$(2)\ (-2) = -4$

$f(x) = \ln(\underbrace{x-8}_{>0})$

Any within a natural logarithm has to be greater than 0.

$$x - 8 > 0$$
$$\underline{\quad +8 \quad +8}$$
$$x > 8$$

$\boxed{\text{Domain: } (8, \infty)}$