

$f(x) = \frac{x}{1+x^2} \rightarrow |f(x)| = g(x) = \begin{cases} x^2+1 & x \geq 0 \rightarrow f'(x) = 2x \\ x^2-1 & x < 0 \rightarrow f'(x) = 2x \end{cases}$

$x < a \rightarrow f(x) = \sqrt{x^2 - a} \rightarrow f'(x) = \left(\frac{x}{x^2 - a} \right) (a - x) = \sqrt{x^2 - a} = 0$
 $\frac{x}{x^2 - a} (a - x) = \sqrt{x^2 - a} \rightarrow x^2 - a = x^2 \rightarrow x = \frac{ra}{a}$

$f\left(\frac{ra}{a}\right) = \frac{r}{r} \rightarrow \sqrt{\frac{r^2 a^2}{r^2 a}} = \frac{ra}{a} = \frac{r}{r} \rightarrow 0 = 0 \rightarrow a = \frac{a}{r}$
 (Note: The last part of the equation is circled in red)

$f(x) = \begin{cases} \sqrt{x^2 - a} & x > 1 \\ \sqrt{-x^2 - a} & -1 < x < 0 \end{cases} \rightarrow f'(x) = \begin{cases} \frac{x^2 - 1}{2\sqrt{x^2 - a}} & x > 1 \\ \frac{-x^2 - 1}{2\sqrt{-x^2 - a}} & -1 < x < 0 \end{cases}$
 $x = \{-1, 0, 1, 2, 3\} \rightarrow K = \{-1, 0, 1\}$

f'	x	$+$	$-$	x	$+$
f	x	$\nearrow$	$\searrow$	x	$\nearrow$

 $m = -1/2 = 1 \rightarrow \frac{Km + n}{K - n} = \frac{5}{2} = 1$

$y' = \frac{m^2 - m - 2}{(n + (m-1))^2} \leq 0 \rightarrow m^2 - m - 2 \leq 0$
 $m \in [-1, 2]$

$0 \leq 1 - m \leq 1 \rightarrow m \geq 0 \rightarrow 1 \cap 0 \rightarrow m \in [0, 1] \rightarrow m = 0, 1$
 $m \neq 2$

$f(x) = \begin{cases} \frac{x}{1-x^2} & x \geq 0 \\ \frac{x}{1+x^2} & x < 0 \end{cases} \rightarrow f'(x) = \begin{cases} \frac{x^2 + 1}{(1-x^2)^2} & x \geq 0 \\ \frac{1-x^2}{(1+x^2)^2} & x < 0 \end{cases}$
 $L > 1 = 1$
 $L < 1 = 1$

۱. نکته: برای $a=0$ نیز صحت دارد

$$\frac{f(n) - f(a)}{n - a} \rightarrow \frac{1 - a/r - 1 + a}{r - 1} = \frac{1/r - 1 + a}{r - 1} = \frac{1/r - 1}{r - 1} + \frac{a}{r - 1} = \frac{1/r - 1}{r - 1} + \frac{1}{r} a \rightarrow$$

$$f'(n) = \frac{a}{nr}$$

$$\rightarrow \frac{1}{r} a = \frac{a}{nr} \rightarrow n = \pm \sqrt{r} \rightarrow n = \sqrt{r} \quad \text{نقطه به راسه} \quad \text{د}$$

$$ra nr^2 - 4n + 18a = n \rightarrow ranr^2 - 4n + 18a = 0$$

$$\rightarrow anr^2 - 4n + 9a = 0 \rightarrow \Delta = 0 \rightarrow 9 - 4a^2 = 0$$

$$a^2 = 1/4 \rightarrow a = \pm 1/2 \rightarrow a = -1/2$$

$$f'(n) = a \quad \text{در } n = \sqrt{r} \quad \text{د}$$

$$f(n) < 0$$

	-r	r
f'(n)	+	-
f	↗	↘

$$f'(n) = 3nr - 12$$

$$\rightarrow n = 2 \quad \text{min} \rightarrow f(2) = 1 - 12 + 12 = -1 \quad \text{د}$$

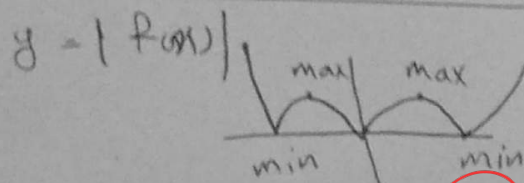
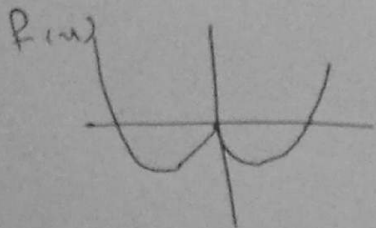
$$f'(n) = 3nr^2 + 4an - rb \rightarrow$$

	-r	0
f'(n)	+	-
f(n)	↗	↘

$$A(nr^2 + m) \rightarrow A = r$$

$$\rightarrow 3nr^2 + 4n = f'(n) < 0 \quad b = 0 \rightarrow f(n) = nr^2 + 4nr \quad \text{د}$$

$$d = \sqrt{4 + r} = \sqrt{4 + 5} = 3$$



$$m = r \rightarrow \frac{n}{m} = \frac{r}{r} = 1 \quad \text{د}$$

