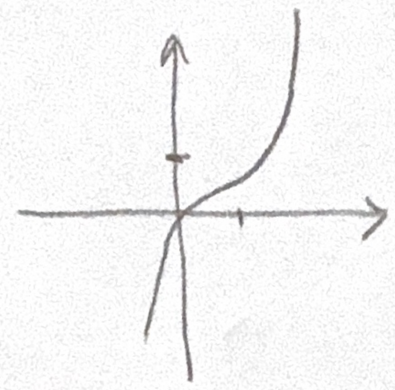
سارا افشین راد

① الف) $y = x^3 - 3x^2 + 3x \longrightarrow y' = 3x^2 - 6x + 3 = 0 \rightarrow y' = 3(x-1)^2 \rightarrow \boxed{x=1}$ جواب

		1	
$F'(x)$	+	0	+
$F(x)$	↗	①	↗

$f(0) = 0$

ب)



② الف)

$y = \frac{-x^3+4}{x^2} = -x + \frac{4}{x^2} \longrightarrow y' = -1 - \frac{\Delta}{x^3} = 0$

$y' = \frac{-x^3-8}{x^3} = 0 \nearrow x = -2 \longrightarrow$ مشتق صفر

$\searrow x = 0 \longrightarrow$ مشتق تعریف نشده

۲ جواب

ب)

$y = \frac{x^2}{x^2-1} \Rightarrow y = \frac{(2x)(x^2-1) - (2x)(x^2)}{(x^2-1)^2} \Rightarrow y' = \frac{2x^3 - 2x^2 - 2x^3}{(x^2-1)^2} = 0$

$y' = \frac{x^4 - 3x^2}{(x^2-1)^2} = 0 \rightarrow y' = \frac{x^2(x^2-3)}{(x^2-1)^2} \nearrow x = 0, \pm\sqrt{3}$ مشتق صفر

$\searrow x = \pm 1$ مشتق تعریف نشده

۵ جواب

③ - الف)

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

$y' = \frac{-2x^2+4x-2+x^2-2x-1}{(x-1)^2} = \frac{-x^2+2x-3}{(x-1)^2} = 0 \longrightarrow x \neq 1$

غیر قابل قبول جزء دامنه نیست

ب)

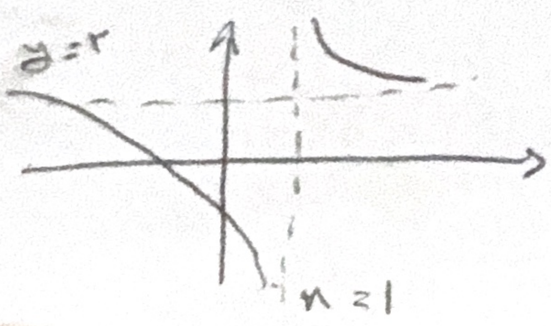
$y = \frac{x^2-4x+3}{x-1} \rightarrow y' = \frac{(2x-4)(x-1) - (x^2-4x+3)}{(x-1)^2} = \frac{(x-3)(x-1)}{(x-1)}$

$= x - 1 = 0 \Rightarrow x = 1$

غیر قابل قبول جزء دامنه نیست $\longrightarrow x = 1$

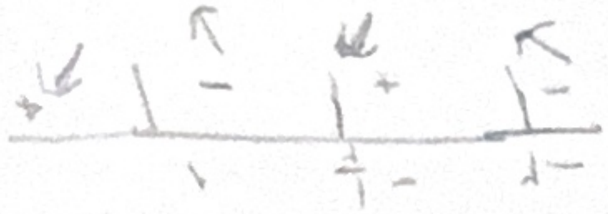
④ - الف) $x \neq 1 \quad y \neq 2$ ب) از هر کدام ناحیه می گذرد

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

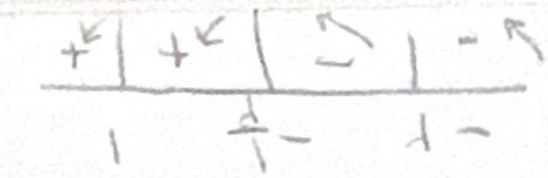


$y = (x-1)(x+2)^2 \rightarrow y = x^3 + x - 2$ $\quad a = 1 \quad b = -2$ $\quad x = -2 \; 1 \rightarrow$ (15)

$y = (x^3 + x - 1)^2 \rightarrow y' = 2(x^3+x-1)(3x^2+1) = 0$ ②



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

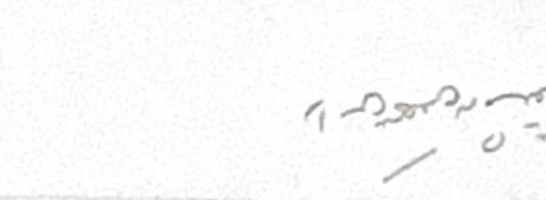


$y = \frac{x^2-1}{x^2+1} \rightarrow y' = \frac{(2x)(x^2+x+2) - (2x+1)(x^2+2)}{(x^2+x+2)^2}$ ⑨

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

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

$x^2 - 2 = 0 \rightarrow x = \pm\sqrt{2}$



$f'(x)$ $\quad -\sqrt{2}$ $\quad +\sqrt{2}$ $\quad +$ $\quad -$ $\quad +$ $\quad f(x)$

$(-\sqrt{2} \quad \frac{2}{2-\sqrt{2}})$ $\quad (+\sqrt{2} \quad \frac{2}{2+\sqrt{2}})$ $\quad$ صعودي $\quad \frac{17}{14} = \frac{\Delta}{7}$ ⑧

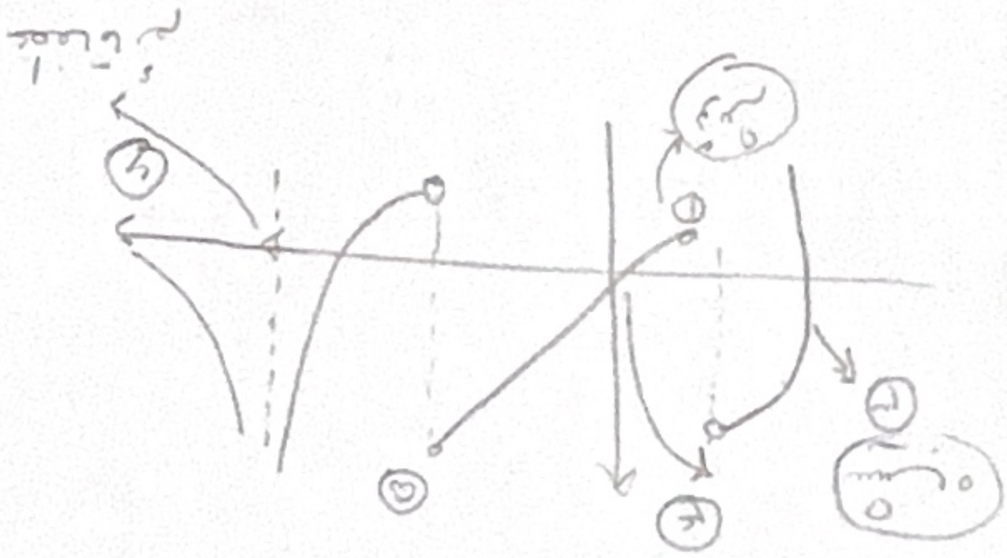
$y = |x^2 - 2x + 2|$ ⟵ (رسم البياني) ⑧

$\rightarrow \Delta > 0 \quad a^2 - \lambda > 0 \quad a^2 > \lambda \quad$ **$a > 2\sqrt{2}$, $a < -2\sqrt{2}$**

$y = \frac{x^2+2}{x^2+2x+2}$ $\rightarrow y' = \frac{(2x)(x^2+2x+2) - (2x+2)(x^2+2)}{(x^2+2x+2)^2}$

$y' = \frac{2x^3 + 4x^2 + 4x - 2x^3 - 4x - 2x^2 - 4}{(x^2+2x+2)^2}$ ⑨

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



⑦

$x \rightarrow \pm\infty \quad y \rightarrow x - 2$

مثال: $y = \frac{2x+1}{x-2} = 2 + \frac{5}{x-2}$ ⟵ تقارب

⑥

$y = \frac{-7}{(x-2)^2}$ ⟵ متناقص. ① تزايد $\quad x^- \rightarrow x = 2$ لا توجد

$x^+ \rightarrow x = 2$ $\quad y = 2$ $\quad$ تقعر $\quad y = \frac{2x+1}{x-2}$ ⟵

⑤

$y = (x-1)(x+2)^2 \rightarrow y = x^3 + x - 2$ $\quad a = 1 \quad b = -2$ $\quad x = -2 \; 1 \rightarrow$ (15)

$y = (x^3 + x - 1)^2 \rightarrow y' = 2(x^3+x-1)(3x^2+1) = 0$ ②

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

$y = \frac{x^2-1}{x^2+1} \rightarrow y' = \frac{(2x)(x^2+x+2) - (2x+1)(x^2+2)}{(x^2+x+2)^2}$ ⑨

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

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

$x^2 - 2 = 0 \rightarrow x = \pm\sqrt{2}$

$f'(x)$ $\quad -\sqrt{2}$ $\quad +\sqrt{2}$ $\quad +$ $\quad -$ $\quad +$ $\quad f(x)$

$(-\sqrt{2} \quad \frac{2}{2-\sqrt{2}})$ $\quad (+\sqrt{2} \quad \frac{2}{2+\sqrt{2}})$ $\quad$ صعودي $\quad \frac{17}{14} = \frac{\Delta}{7}$ ⑧

$y = |x^2 - 2x + 2|$ ⟵ (رسم البياني) ⑧

$\rightarrow \Delta > 0 \quad a^2 - \lambda > 0 \quad a^2 > \lambda \quad$ **$a > 2\sqrt{2}$, $a < -2\sqrt{2}$**

$y = \frac{x^2+2}{x^2+2x+2}$ $\rightarrow y' = \frac{(2x)(x^2+2x+2) - (2x+2)(x^2+2)}{(x^2+2x+2)^2}$

$y' = \frac{2x^3 + 4x^2 + 4x - 2x^3 - 4x - 2x^2 - 4}{(x^2+2x+2)^2}$ ⑨

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

⑦

$x \rightarrow \pm\infty \quad y \rightarrow x - 2$

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⑥

$y = \frac{-7}{(x-2)^2}$ ⟵ متناقص. ① تزايد $\quad x^- \rightarrow x = 2$ لا توجد

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⑤