

{ 0911-121-3041 محمد جعفری }

$$x^r - vx^r - a = 0 \xrightarrow{x^r = t} t^r - vt - a = 0 \rightarrow$$

(4) - 1.1

$$t = \frac{v \pm \sqrt{v^2 + 4a}}{r} \xrightarrow{x^r = t} x^r = \frac{1}{r} \sqrt{v^2 + 4a} \rightarrow \begin{cases} S = 0 \\ P = \frac{1}{r} (v + \sqrt{v^2 + 4a}) \end{cases} \rightarrow$$

$$rP^r - rSP + rS = \frac{1}{r} (v^2 + 4a + 4a + 4v\sqrt{v^2 + 4a}) = 2a + v\sqrt{v^2 + 4a}$$

$$\begin{pmatrix} \log a & \log r \\ \log r & \log a \end{pmatrix} \cdot \log_{\frac{a}{r}}(rx-r) = 1 \rightarrow$$

(5) - 1.2

$$[(\log a)^r - (\log r)^r] \cdot \log_{\frac{a}{r}}(rx-r) = 1 \rightarrow$$

$$(\log a - \log r)(\log a + \log r) \cdot \log_{\frac{a}{r}}(rx-r) = 1 \rightarrow$$

$$\log_{\frac{a}{r}} \cdot \log 1 \cdot \log_{\frac{a}{r}}(rx-r) = 1 \rightarrow \log_{\frac{a}{r}} \cdot \frac{\log(rx-r)}{\log \frac{a}{r}} = 1 \rightarrow$$

$$\log(rx-r) = 1 \rightarrow rx-r = 1 \rightarrow x = \frac{r+1}{r}$$

(6) - 1.3

$$(\log_{r1}^r)^r + \left(\log_{r1}^{\frac{r \times v}{1^r \times v}}\right) \cdot \left(\log_{r1}^{\frac{r \times (v+1)^r}{1^r \times r^r}}\right) =$$

$$(\log_{r1}^r)^r + (1 + \log_{r1}^{\frac{v}{r}}) \cdot (r + \log_{r1}^r) =$$

$$(\log_{r1}^r)^r + (r - \log_{r1}^r) \cdot (r + \log_{r1}^r) = (\log_{r1}^r)^r + r - (\log_{r1}^r)^r = r$$

(7) - 1.4

$$\frac{((m^r-1)x^r - fmx + f) \cdot (x - r\sqrt{x} + r)}{rx - r} > 0 ; x > \frac{r}{f} \rightarrow$$

$$\frac{((m^r-1)x^r - fmx + f) \cdot (\sqrt{x} - 1)(\sqrt{x} - r)}{(rx - r) +} > 0 ; x > \frac{r}{f} \rightarrow$$

$$A = ((m^r-1)x^r - fmx + f) \cdot (\sqrt{x} - r) > 0 ; x > \frac{r}{f}$$

ادامه سوال ۱.۲ :

طین مفرجه جواب
 $x=2 \rightarrow 2m^2 - 2 - 8m + 2 = 0 \rightarrow 2m^2 - 8m = 0 \rightarrow m = 0, 2$

if: $m=2 \rightarrow A = (3x^2 - 8x + 2) \cdot (\sqrt{x} - 2) = (3x - 2)(x - 2) \cdot (\sqrt{x} - 2); x > \frac{2}{3}$

x	$\frac{2}{3}$	2	2	$+\infty$
A		+	-	+

غیر قابل قبول است.

if: $m=0 \rightarrow A = (-x^2 + 2) \cdot (\sqrt{x} - 2) = (2 - x)(2 + x) \cdot (\sqrt{x} - 2) > 0; x > \frac{2}{3}$

x	$\frac{2}{3}$	2	2	$+\infty$
A		-	+	-

قابل قبول $m=0$ می باشد.

$$\begin{aligned} \text{tg } \frac{\alpha}{2} = \frac{1}{2} &\rightarrow \begin{cases} \text{tg } \alpha = \frac{2 \text{tg } \frac{\alpha}{2}}{1 - \text{tg}^2 \frac{\alpha}{2}} = \frac{2(\frac{1}{2})}{1 - \frac{1}{4}} = \frac{1}{\frac{3}{4}} = \frac{4}{3} \\ \sin \alpha = \frac{2 \text{tg } \frac{\alpha}{2}}{1 + \text{tg}^2 \frac{\alpha}{2}} = \frac{2(\frac{1}{2})}{1 + \frac{1}{4}} = \frac{1}{\frac{5}{4}} = \frac{4}{5} \\ \cos \alpha = \frac{1 - \text{tg}^2 \frac{\alpha}{2}}{1 + \text{tg}^2 \frac{\alpha}{2}} = \frac{1 - \frac{1}{4}}{1 + \frac{1}{4}} = \frac{\frac{3}{4}}{\frac{5}{4}} = \frac{3}{5} \end{cases} \quad \textcircled{2} - 102 \end{aligned}$$

$$\rightarrow \frac{\text{tg } \alpha - \sin \alpha}{\sin \alpha - \cos \alpha} = \frac{\frac{4}{3} - \frac{4}{5}}{\frac{4}{5} - \frac{3}{5}} = \frac{1(\frac{2}{15})}{\frac{1}{5}} = \frac{-12}{102}$$

$f(\alpha) = 2 \sin \alpha \cdot \cos 2\alpha + 2 \sin \alpha \rightarrow f(\frac{11\pi}{9}) = ? \quad \textcircled{1} - 104$

$2 \sin a \cdot \cos b = \sin(a+b) + \sin(a-b)$

$\rightarrow f(\alpha) = 2(\sin 3\alpha + \sin(-\alpha)) + 2 \sin \alpha = 2 \sin 3\alpha \rightarrow f(\frac{11\pi}{9}) = 2 \sin(\frac{11\pi}{3}) = 2 \sin(12\pi - \frac{\pi}{3}) = -2 \sin \frac{\pi}{3} = -\sqrt{3}$

$$(1 + \cos 2\alpha) \cdot (1 + \cos 4\alpha) \cdot (1 + \cos 8\alpha) = \frac{1}{\lambda} \rightarrow$$

④ - 1.0V

$$(\cos^2 \alpha) \cdot (\cos^2 2\alpha) \cdot (\cos^2 4\alpha) = \frac{1}{\lambda} \rightarrow$$

$$\cos^2 \alpha \cdot \cos^2 2\alpha \cdot \cos^2 4\alpha = \pm \frac{1}{\lambda} \quad \frac{\sin \alpha \rightarrow \text{طرفین ضرب کنیم}}{\text{طرفین ضرب کنیم}}$$

$$\underbrace{\sin \alpha \cdot \cos 2\alpha \cdot \cos 4\alpha}_{\frac{1}{\lambda} \sin 8\alpha} = \pm \frac{1}{\lambda} \sin 8\alpha \rightarrow \frac{1}{\lambda} \sin 8\alpha = \pm \frac{1}{\lambda} \sin \alpha \rightarrow$$

$$\sin 8\alpha = \pm \sin \alpha \rightarrow \begin{cases} 8\alpha = k\pi + \alpha \rightarrow \alpha = \frac{k\pi}{7} \\ 8\alpha = k\pi - \alpha \rightarrow \alpha = \frac{k\pi}{9} \end{cases} \quad \alpha \in [0, \pi]$$

$$\begin{cases} \alpha = 0, \frac{\pi}{7}, \frac{2\pi}{7}, \dots, \frac{6\pi}{7} \\ \alpha = 0, \frac{\pi}{9}, \frac{2\pi}{9}, \dots, \frac{8\pi}{9} \end{cases} \rightarrow \max \alpha = \frac{8\pi}{9}$$

$$p(x) = \frac{p'(x)}{\frac{1}{x+1}} \Rightarrow p(x) = ax^2 + bx + c \rightarrow p'(x) = 2ax + b \rightarrow$$

⑤ - 1.0A

$$ax^2 + bx + c \equiv \left(\frac{1}{x+1}\right)(2ax + b) - 2 \rightarrow$$

$$ax^2 + bx + c \equiv ax^2 + \left(2a + \frac{b}{x+1}\right)x + (b - 2) \rightarrow$$

$$\begin{cases} a = a \checkmark \\ b = 2a + \frac{b}{x+1} \rightarrow b = 2a \\ c = b - 2 \rightarrow c = 2a - 2 \end{cases}$$

$$\rightarrow a + b + c = a + 2a + 2a - 2 = 5a - 2$$

$$5a - 2 \geq 5(1) - 2 = 3$$

$$a \in \mathbb{N} \rightarrow a \geq 1$$

$$\rightarrow \min(a + b + c) = 3$$

$$a_{n+1} = 1 + \frac{1}{a_n} ; a_1 = 1, a_{100} = \frac{k}{m} \rightarrow a_{99} = ?$$

① - 1.9

$$a_{100} = \frac{k}{m} \rightarrow 1 + \frac{1}{a_{99}} = \frac{k}{m} \rightarrow \frac{1}{a_{99}} = \frac{k}{m} - 1 = \frac{k-m}{m} \rightarrow a_{99} = \frac{m}{k-m}$$

$$1 + \frac{1}{a_{98}} = \frac{m}{k-m} \rightarrow \frac{1}{a_{98}} = \frac{m}{k-m} - 1 = \frac{m-k}{k-m} \rightarrow a_{98} = \frac{k-m}{m-k}$$

مجموع جفتی ۰۹۱۱-۱۵۸-۲۰۴۱

محمود جعفر ٥٩١١-١٥١-٣٥٤١

$$a_n = \begin{cases} r^k & ; n = rk \\ -rk + r & ; n = rk + 1 \\ a + \left[\frac{n}{k+r} \right] & ; n = rk + r \end{cases} \quad , n = 0, 1, 2, 3, \dots$$

① - 110

$$\rightarrow a_0 + a_1 + a_2 + \dots + a_9 = 1 + r + (1+a) + r + r + (1+a) + r + 0 + (r+a) + 1$$

$$\xrightarrow{\text{طريق آخر}} 2a + 3a = 19 \rightarrow a = -2$$

$$a_0 + a_1 + \dots + a_9 = 19$$

$$\rightarrow a_r + a_{2r} + a_{3r} + \dots + a_{9r} = (a+1) + (a+1) + (a+2) + (a+2) + \dots + (a+2) \stackrel{a=-2}{=} -1 -1 + 0 + 0 + \dots + 0 = -2$$

$$f(x) = r^{\sqrt{9\cos^2 x - 1}} - r^{\sqrt{1 - 9\cos^2 x}} \quad \text{--- 111 --- ④}$$

$$t = \sqrt{9\cos^2 x - 1} \quad \begin{matrix} 0 \leq \cos^2 x \leq 1 \rightarrow \\ -1 \leq 9\cos^2 x - 1 \leq 1 \end{matrix} \rightarrow -1 \leq t \leq 1$$

$$f(t) = r^t - r^{-t} = r^t - \frac{1}{r^t} \quad \begin{matrix} \text{الكثير الصغرى} \\ \text{الكثير المتزول} \end{matrix} \quad \begin{matrix} f(t) \text{ الكثير الصغرى} \\ -1 \leq t \leq 1 \end{matrix}$$

$$\begin{cases} t = -1 \rightarrow y = r^{-1} - r = -\frac{r}{r} = a \\ t = 1 \rightarrow y = r^1 - r^{-1} = r - \frac{1}{r} = \frac{r^2 - 1}{r} = b \end{cases} \rightarrow b - a = \frac{r^2 - 1}{r}$$

$$f(x) = \log\left(\frac{1}{4 + \sqrt{|x|} - |x|}\right) \rightarrow 4 + \sqrt{|x|} - |x| > 0 \quad \sqrt{|x|} = t \quad \text{--- 112 --- ①}$$

$$4 + t - t^2 > 0 \rightarrow t^2 - t - 4 < 0 \rightarrow -2 < t < 3 \rightarrow -2 < \sqrt{|x|} < 3 \rightarrow 4 < |x| < 9 \rightarrow -9 < x < 9$$

$\{0911-1211-2041\}$ محمود جعفری

$$f(x) = \sqrt{2-x}$$

$$\frac{k + f(x - (k-1))}{k + f(x - (k-1))} \rightarrow g(x) = k + \sqrt{2-x+k-1} = k + \sqrt{2+k-x}$$

(1,1) ∈ g

$$k + \sqrt{2+k-1} = 1 \rightarrow \sqrt{k+1} = 1-k \rightarrow k+1 = k^2+1-2k \rightarrow k^2-2k=0 \rightarrow \begin{cases} k=0 \\ k=2 \end{cases}$$

$k=0 \checkmark$
 $k=2 \times$ (مورد قبول نیست)

$$\rightarrow g(x) = \sqrt{2-x} \rightarrow$$

$$h(x) = -1 + \sqrt{2-x} \xrightarrow{y=0} -1 + \sqrt{2-x} = 0 \rightarrow \sqrt{2-x} = 1 \rightarrow 2-x=1 \rightarrow x=1$$

$$f(x) = \begin{cases} -1 & ; x < -1 \\ x & ; -1 \leq x \leq 1 \\ 1 & ; x > 1 \end{cases}, g(x) = 1-x^2 \rightarrow$$

$$(f \circ g)(x) = f(g(x)) = \begin{cases} -1 & ; 1-x^2 < -1 \rightarrow x^2 > 2 \rightarrow |x| > \sqrt{2} \\ 1-x^2 & ; -1 \leq 1-x^2 \leq 1 \rightarrow 0 \leq x^2 \leq 2 \rightarrow |x| \leq \sqrt{2} \end{cases}$$

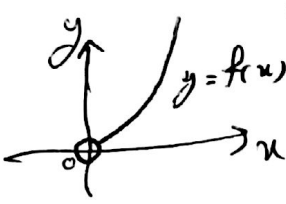
$$\rightarrow (f \circ g)'(x) = \begin{cases} 0 & ; |x| > \sqrt{2} \\ -2x & ; |x| < \sqrt{2} \end{cases} \rightarrow \begin{matrix} x = \pm \sqrt{2} \text{ برای } f \circ g \\ \text{مشتق ناپذیر است} \end{matrix}$$

$$(g \circ f)(x) = g(f(x)) = \begin{cases} 0 & ; |x| > 1 \\ 1-x^2 & ; |x| \leq 1 \end{cases}$$

$$\rightarrow (g \circ f)'(x) = \begin{cases} 0 & ; |x| > 1 \\ -2x & ; |x| < 1 \end{cases} \rightarrow \begin{matrix} x = \pm 1 \text{ برای } g \circ f \\ \text{مشتق ناپذیر است} \end{matrix}$$

مجموع جعنه ۰۹۱۱-۱۲۸-۲۰۴۱

$f(x) = 9^{\log_9 x} = x^{\log_9 9} = x^1 = x \quad ; x > 0$



② - ۱۱۴

$\lim_{x \rightarrow 0^+} \frac{t^r (\frac{1}{\sqrt{1-x^2}} - 1)}{(1 - \cos \sqrt{2x})^n} = a$

به کمک هم از این داریم

④ - ۱۱۶

$a = \lim_{x \rightarrow 0^+} \frac{(\frac{1}{\sqrt{1-x^2}} - 1)^r}{(1 - (1 - \frac{2x}{r}))^n} = \lim_{x \rightarrow 0^+} \frac{(\frac{1}{1-x^2} - 1)^r}{x^n} = \lim_{x \rightarrow 0^+} \frac{x^r}{r x^n}$

$n = r, \quad a = \frac{1}{r}$

$\lim_{x \rightarrow -\frac{1}{r}^-} \frac{10x - 2 + [\frac{r}{x^2}]}{14x - [-\frac{r}{x^2}]} = \lim_{x \rightarrow -\frac{1}{r}^-} \frac{10x - 2 + 11}{14x + 11} = \lim_{x \rightarrow -\frac{1}{r}^-} \frac{-2 - 2 + 11}{11(2x + 1)} = \frac{1}{0^-} = -\infty$

$x < -\frac{1}{r} \rightarrow x^2 > \frac{1}{r^2} \rightarrow \frac{1}{x^2} < r \rightarrow \begin{cases} \frac{r}{x^2} < 11 \\ -\frac{r}{x^2} > -11 \end{cases}$

$f(x) = \frac{ax^3 - bx^2 + r}{ax^3 - bx + r}$

if: $a=0, b=r \rightarrow f(x) = \frac{-rx^2+r}{-rx+r}$

if: $a=1, b=10 \rightarrow f(x) = \frac{1x^3 - 10x^2 + r}{1x^3 - 10x + r}$

if: $a=-2, b=0 \rightarrow f(x) = \frac{-2x^3+r}{-2x^3+r} = 1$

if: $a=-1, b=-9 \rightarrow f(x) = \frac{-1x^3 + 9x^2 + r}{-1x^3 + 9x + r}$

تنها در $a=1$ تابع به $x=1$ تبدیل می شود
 متوجه شدیم که در این مورد تابع در نقطه نامعین است
 تابع ثابت با نقطه توغالی $x=1$

$\frac{1x^3 - 10x^2 + r}{1x^3 - 10x + r} \xrightarrow{x=1} \frac{1 - 10 + r}{1 - 10 + r} = 1$

خروجی در این معادله \checkmark

④ - ۱۱۸

0911-1221-3041

محمود جعفری

$$\left[-1 = \lim_{n \rightarrow -\infty} \frac{\sqrt{(a^{2n} - 1)(a^{4n} - 1) \dots (a^{100n} - 1)}}{a^{2n} - 1} \right] \approx$$

(2) -119

$$\lim_{n \rightarrow -\infty} \frac{a^{2+4+\dots+100}}{a^{2n} - 1} = \lim_{n \rightarrow -\infty} \frac{a^{5050}}{a^{2n} - 1} = \lim_{n \rightarrow -\infty} \frac{|a|^{5050}}{|a|^{2n} - 1} = \frac{a^{5050}}{a^{2n} - 1}$$

$$\lim_{n \rightarrow -\infty} \frac{-a^{2n} \cdot n}{n^k} \rightarrow k=2, a=1$$

در حالت $a < 0$ خواهیم داشت: $a^2 = -1$ که غیر قابل قبول است.

(2) -120

$$\begin{cases} f(x) = c \cdot x^2 + ax^2 + b \\ 0 = \lim_{x \rightarrow 0^+} \frac{f(x)}{x} \Rightarrow f(0) = 0 \rightarrow b = -1 \\ \gamma = \lim_{x \rightarrow 0^+} \frac{f'(x)}{x} = f''(0) \rightarrow (-4c \cos 2x \cdot \sin 2x + 2ax)' = \\ 0 = 12c \cos 2x + 2a \big|_{x=0} = -12 + 2a \rightarrow 2a = 12 \rightarrow a = 6 \end{cases}$$

$$f(x) = 1 + |\sin 2x| = \begin{cases} 1 + \sin 2x & ; x > 0 \text{ د حوالی} \\ 1 - \sin 2x & ; x < 0 \text{ د حوالی} \end{cases}$$

$$f'(x) = \begin{cases} 2 \cos 2x & ; x > 0 \\ -2 \sin 2x & ; x < 0 \end{cases} \rightarrow \begin{cases} f'(0) = 2 \\ f'(0) = -2 \end{cases} \xrightarrow{f(0)=1 \rightarrow x=0}$$

$$\begin{cases} y = 2x + 1 \\ y = -2x + 1 \end{cases} \xrightarrow{y=-x} \begin{cases} 2x = -1 \rightarrow x = -\frac{1}{2} \\ x = 1 \end{cases} \rightarrow \begin{cases} A = \frac{1}{\sqrt{2}} \\ B = -1 \end{cases} \rightarrow AB = \sqrt{2(1 + \frac{1}{2})^2} = \frac{\sqrt{2}}{2}$$

0911-128-3041 محمود جعفری

$$f(x) = 2\sqrt{x} - \frac{2}{2\sqrt{x^2-1}} \rightarrow f'(x) = \frac{1}{\sqrt{x}} + \frac{x}{\sqrt{(x^2-1)^3}} > 0$$

تابع همباز قائم $x=1$ $x > 0$

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

x	$-\infty$	0	1	$\sqrt[3]{3}$	$+\infty$
y'	+	0	-	0	+

تابع در $x=2$ همباز قائم است:
 کوفته‌ها از هم جدا نیستند (از):
 $\sqrt[3]{32} - 2 = 2(\sqrt[3]{4} - 1)$

$$f(x) = 2x^3 - 3x^2 - 12x + 1 \rightarrow$$

$$f'(x) = 6x^2 - 6x - 12 = 6(x^2 - x - 2) = 0 \rightarrow x = -1, 2 \rightarrow$$

$A|-1, B|2 \rightarrow m_{AB} = -9$

$$\therefore 6x^2 - 6x - 12 = -9 \rightarrow 6x^2 - 6x - 3 = 0 \rightarrow 2x^2 - 2x - 1 = 0 \rightarrow \Delta > 0$$