عارفه پورمیری تکلیف ۲۳

Subject:
Year. Month. Date. ( )

۱۸,۷۵

① $g'(x) = f'(\tan^2 x + \sqrt{2}\cos x) \times 2\tan x \times (1+\tan^2 x) \times -\sqrt{2}\sin x$

$g'(\frac{\pi}{4}) = \sqrt{3} = f'(2) \times 2 \times 2 \times (-1) \rightsquigarrow \boxed{f'(2) = -\frac{\sqrt{3}}{4}}$

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② $f'(\frac{7\pi}{6}) - 2g'(\frac{7\pi}{6}) = ? \rightarrow -\cos x \xrightarrow{\text{مشتق}} \sin x = \sin(\frac{7\pi}{6}) = \boxed{-\frac{1}{2}}$ جواب

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$f(x) - 2g(x) = \frac{(2+\cos x)(\cos^2 x - 2\cos x + 4)}{(2-\cos x)(2+\cos x)} - \frac{4}{2-\cos x} = \frac{\cos x(\cos x - 2)}{2-\cos x} = -\cos x$

③ $\frac{2\sqrt{6}}{2} = \sqrt{6} = f'_+(\frac{3}{4})$ چون قدر مطلق است، مشتق چپ و راست ترتیبی حد تیز اند پس:

$(4x-3)\sqrt{ax} \xrightarrow[f'(\frac{3}{4})]{\text{مشتق}} 4\sqrt{ax} + \frac{a}{2\sqrt{ax}} \times (4x-3) = \sqrt{6} \Rightarrow 4\sqrt{\frac{3}{4}a} = \sqrt{6}$

$16 \times \frac{3}{4}a = 6$

$\Rightarrow \boxed{a = \frac{1}{2}}$

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④ $f(4) = -4a + 2 \quad f'(4) = -a \Rightarrow -5a + 2 = -1 \quad a = \frac{3}{5}$

$\longrightarrow \boxed{f'(4) = -\frac{3}{5}}$

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⑤ $m = \frac{1}{7}$ / $y' = \frac{a+3}{(3x+1)^2} = \frac{1}{7}$

$y = \frac{x+5}{7} \qquad \frac{ax-1}{3x+1} = \frac{x+5}{7} \Rightarrow 7ax - 7 = 3x^2 + 16x + 5$

$0 = 3x^2 + (16-7a)x + 12$

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$\rightarrow \Delta = 0 \rightarrow (16-7a)^2 = 144 \rightsquigarrow 16 - 7a = 12 \rightarrow a = \frac{4}{7}$ ؛ $-12 \rightarrow a = 4$

$a = \frac{4}{7} \xrightarrow{\text{جایگذاری در تابع}} 3x^2 + 12x + 12 = 0$

$3(x+2)^2 = 0 \quad x = -2$ غیرقابل قبول / $\boxed{a = 4}$

⑥ $1^{\circ}_{\circ} \Rightarrow a = 8 + 2a - b$ / $f'(2) = 3x^2 + a \rightsquigarrow \boxed{a = -12}$

$b = 8 - 24$

$\boxed{b = -16} \qquad b - a = -16 + 12 = \boxed{-4}$

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$\cos ax \to 1 - \frac{a^2x^2}{2}$

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(۷) $f'(x) = n \sin x^r \times \cos x^r \times 2x$

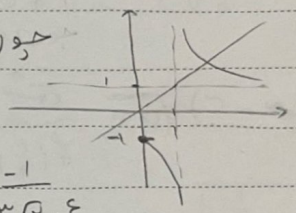
$$\lim_{x\to 0} \frac{\sin^n x^r \cdot n \sin x^r \cdot \cos x^r \cdot 2x}{(1-\cos x)^m} \xrightarrow{\text{هم‌ارز}} \frac{x^{2n} \cdot n x^2 \left(1-\frac{x^2}{2}\right)^1 \cdot 2x \times 2^m}{x^{2m}} = 2\sqrt{2}$$

$\Rightarrow 2^m \times 2n\, x^{2n+2} = 2^{\frac{11}{2}} \, x^{2m}$ $\rightarrow$ $2n+2 = 2m$ / $2^m \times 2n = 32\sqrt{2}$

$2n = 2m-2$ $\quad 2^m \times 4 = 2^{\frac{15}{2}}$ $\quad m = \frac{7}{2}$ و $n = 2$

$2m+n = 9$ جواب

(۸) $f'(x) = (f^{-1}(x))'$ چون $a+d=0$ پس وارون تابع با خود تابع برابر است



$$f'(x) = \frac{\frac{1}{2\sqrt{x}}(\sqrt{x}-1) - \frac{1}{2\sqrt{x}}(\sqrt{x}+1)}{(\sqrt{x}-1)^2} = \frac{\frac{1}{2\sqrt{2}}(-2)}{(\sqrt{2}-1)^2} = \frac{-1}{\sqrt{2}(3-2\sqrt{2})} = \frac{-1}{4\sqrt{2}-6}$$

$\Rightarrow \frac{6+4\sqrt{2}}{-2} = -3 - \frac{4}{2}\sqrt{2}$ جواب

(۹) $\frac{f(0)-f(-1)}{1} = 1 - 8(1-a) = -11 \rightsquigarrow 1-8+8a = -11 \rightsquigarrow a = -\frac{1}{2}$

$f'(1) \Rightarrow 3(x^2+1)^2 (2x)\left(-\frac{1}{2}x+1\right) + \left(-\frac{1}{2}\right)(x^2+1)^3 = 4 - 6 = -2$ جواب

(۱۰) $\frac{f(\frac{\pi}{2}) - f(\frac{\pi}{6})}{g(\frac{\pi}{2}) - g(\frac{\pi}{6})} = ?$

$\Rightarrow \frac{\sin\frac{\pi}{2}\cdot\cos\pi - \sin\frac{\pi}{6}\cdot\cos\frac{\pi}{2}}{\left(\sin^4\frac{\pi}{2} - \cos^4\frac{\pi}{2}\right)\left(\sin^4\frac{\pi}{2} - \cos^4\frac{\pi}{2}\right)} = -1$ جواب

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$g(x) = f'(\tan^2 x + \sqrt{2}\cos x) \times 2\tan x(1+\tan^2 x) - \sqrt{2}\sin x$

$g'(\frac{\pi}{4}) = f'(1+\sqrt{2}\times\frac{\sqrt{2}}{2}) \times 2\times 1\times(1+1^2) - (\sqrt{2}\times\frac{\sqrt{2}}{2})$

$g'(\frac{\pi}{4}) = f'(2)\times[4-1] \longrightarrow f'(2) = \frac{\sqrt{2}}{3}$

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$f^{-1}(2) = t \rightarrow f(t) = 2 \longrightarrow \sqrt{t+1} = 2\sqrt{t}-2 \rightarrow \sqrt{t} = 4 \rightarrow t = 9$

$f^{-1\prime}(2) = \frac{1}{f'(9)}$ ، $f'(x) = \frac{-2}{(\sqrt{x}-1)^2}\times\frac{1}{2\sqrt{x}}$

$f'(9) = \frac{-2}{(2)^2}\times\frac{1}{6} = -\frac{1}{12} \longrightarrow f^{-1\prime}(2) = -12$

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$\frac{f(0)-f(-1)}{0-(-1)} = \frac{1-(-a+1)}{1} = 2a-2 = -11 \rightarrow 2a = -9 \rightarrow \boxed{a=-\frac{9}{2}}$

$f'(x) = 3(x^2+1)^2(2x)(ax+1) + a(x^2+1)^3 \xrightarrow{-2a=1} f'(1) = 3(2)^2(2)(\frac{1}{2}) + -\frac{1}{2}(2)^3$

$f'(1) = 12-4 = 8$