

رک، کالیف

10/10

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$$\lim_{x \rightarrow \infty} \frac{x-1}{x} = \frac{x}{x} \rightarrow f(x) = \frac{x}{x}$$

(1)

$$A(-1,1), B(x,y) \rightarrow m_{AB} = \frac{y-1}{x+1} = \frac{1}{x} \rightarrow y-1 = \frac{1}{x}(x+1) \rightarrow y = \frac{1}{x} + 1 = \frac{x+1}{x}$$

(2)

$$\sqrt{ax-1} = \frac{1}{c} \rightarrow \sqrt{ax-1} = \frac{1}{c}$$

$$x^2 + (2-2a)x + 1 = 0 \rightarrow (1-2a)x^2 - 1 = 0 \rightarrow (1-2a) = \pm 1$$

$$1-2a=1 \rightarrow a=0, 1-2a=-1 \rightarrow a=1$$

$$f(x) = \sqrt{x-1} \rightarrow f(x) = \sqrt{x} = x$$

$$y = \frac{x^2 + mx + 1}{x+1} \rightarrow y' = \frac{(2x+m)(x+1) - (x^2 + mx + 1)}{(x+1)^2} = y'(1) = \frac{c}{k} \rightarrow cy - cx = h$$

(3)

$$y = \frac{c}{k} x + \frac{h}{k} \rightarrow c(m+k) - k = m \rightarrow m = k \rightarrow \frac{c}{k} x + \frac{h}{k} = y \rightarrow \frac{c}{k} + \frac{h}{k} = 1 \rightarrow \frac{c+h}{k} = \frac{c}{k}$$

$$h=1 \rightarrow k=k$$

$$g(x) = \frac{k}{k \sin x} \rightarrow g'(x) = \frac{-k \cos x}{(k \sin x)^2} \rightarrow g'(\frac{\pi}{2}) = \frac{-1}{(1-\sqrt{1})^2}$$

(4)

$$f(x) = \frac{2V - \sin^2 x}{x - \sin x} = \frac{(2 - \sin x)(x + \sin x + \cos x)}{(x + \sin x)(x - \sin x)} = \frac{2 + x \sin x + \cos x}{x + \sin x}$$

$$f'(x) = \frac{(2 + x \sin x + \cos x)(x + \sin x) - (x + \sin x)^2}{(x + \sin x)^2}$$

$$f'(\frac{\pi}{2}) = \frac{2 + \frac{\pi}{2} + 1}{(\frac{\pi}{2} - 1)^2} \rightarrow \frac{3 + \frac{\pi}{2}}{(\frac{\pi}{2} - 1)^2} = \frac{6 + \pi}{\pi}$$

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

(5)

$$g(x) = \frac{f(x)-1}{x} = \frac{(-1+\sin x)^r - 1}{x} \approx \frac{-r \sin x}{x(1+\sin x)}$$

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$$f'(x) f'(-x) = -1 \rightarrow f(x) = -x - 1 \rightarrow f'(x) = -1$$

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

$$f(x) = \sqrt{x} (6x^2 + 0) = 6x^{5/2} \rightarrow f'(x) = 15x^{3/2} + 0x^{-1/2} = 15x^{3/2} = \left(\sqrt{6x} + \frac{1}{\sqrt{6x}}\right)x$$

$$\sqrt{a^2} + \sqrt{b^2} = \sqrt{a^2 + b^2} \rightarrow \sqrt{12x^2} - \sqrt{6x} = 0 \rightarrow \sqrt{12x} (6x - 1) = 0 \rightarrow 6x = 0 \text{ or } 6x = \frac{1}{6} \checkmark$$

$x = -\frac{1}{6}x$

$$m = 15 \cdot \sqrt{\left(\frac{1}{6}\right)^{3/2}} + 0 \cdot \sqrt{12} = 15\sqrt{12}$$

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

$$-1 = 0 \rightarrow x^2 = -1 \rightarrow x = \pm i \checkmark$$

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

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

$$g'\left(\frac{1}{4}\right) = -2 \cdot \frac{1}{\sqrt{0}} \rightarrow \text{undefined}$$

$$f'(x) = 2x^2 - 1 \rightarrow f'(g(x)) = 2\left(\frac{1}{\sqrt{4x-1}}\right)^2 - 1 = 2(4x-1)^{-1} - 1 = 2(4x-1)^{-1} - 1$$