QUIZ 3

(2 pts)

1) Find $f'(x)$ for $f(x) = 2x^2 - 5$ using the limit process.

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$f(x+h)$: $2(x+h)^2 - 5 = 2(x^2 + 2xh + h^2) - 5$

$= 2x^2 + 4xh + 2h^2 - 5$

$f(x+h) - f(x)$: $2x^2 + 4xh + 2h^2 - 5 - (2x^2 - 5)$

$2x^2 + 4xh + 2h^2 - 5 - 2x^2 + 5$

$\frac{f(x+h) - f(x)}{h}$: $\frac{4xh + 2h^2}{h} = 4x + 2h$

$f'(x)$: $\lim_{h \to 0} 4x + 2h = \boxed{4x}$.

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2) (2 pts) $y = \sqrt{x}(7x - 1) + \sin x$ $\quad 7x\sqrt{x} - \sqrt{x}$

Rewrite: $y = 7x^{3/2} - x^{1/2} + \sin x$

$\frac{dy}{dx} = 21/2\, x^{1/2} - 1/2\, x^{-1/2} + \cos x$

$= 21/2\sqrt{x} - 1/2\sqrt{x} + \cos x$.

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3) (1 pt) $f(x) = \begin{cases} 4x^2 - \pi^2 + 1 & x \le \pi/2 \\ 5\sin(x) - 4 & x > \pi/2 \end{cases}$

Check: $4(\pi/2)^2 - \pi^2 + 1 = 4(\frac{\pi^2}{4}) - \pi^2 + 1$

$= \pi^2 - \pi^2 + 1$

$= 1$

$5\sin(\pi/2) - 4 = 5(1) - 4 = 1$.

Which ONE is true?

A) jump at $x = \pi/2$

B) hole at $x = \pi/2$

C) $f(\pi/2) = -4$

D) continuous at $x = \pi/2$

They match!