

Quiz #5

Directions: Carefully read each question below and answer to the best of your ability in the space provided. You **MUST** show your work to receive full credit! Your answer to problem # 2 should be written in a clear and concise manner using a combination of complete sentences and symbolic expressions. An answer without explanation or that is poorly presented may not receive full credit.

1. (1 point) Find the derivative of $\sin(x^3 + x)$.
A. $\cos(x^3 + x)$
B. $\sin(3x^2 + 1)$
C. $(3x^2 + 1) \cos(x^3 + x)$
D. $(3x^2 + 1) \sin(x^3 + x)$
E. $\cos(3x^2 + 1)$
2. (2 points) Find the n -th derivative of $\cos(x)$. Explain your work.

Solution: Note the following:

$$\begin{aligned}\frac{d}{dx}(\cos(x)) &= -\sin(x) & \frac{d^2}{dx^2}(\cos(x)) &= -\cos(x) \\ \frac{d^3}{dx^3}(\cos(x)) &= \sin(x) & \frac{d^4}{dx^4}(\cos(x)) &= \cos(x)\end{aligned}$$

Thus we have a cycle of 4 derivatives with this in mind

$$\frac{d^n}{dx^n}(\cos(x)) = \begin{cases} \cos(x) & \text{if } \frac{n}{4} \text{ has a remainder } 0 \\ -\sin(x) & \text{if } \frac{n}{4} \text{ has a remainder } 1 \\ -\cos(x) & \text{if } \frac{n}{4} \text{ has a remainder } 2 \\ \sin(x) & \text{if } \frac{n}{4} \text{ has a remainder } 3 \end{cases}$$

Name: _____

Question:	1	2	Total
Points:	1	2	3
Score:			