Quiz 4 Solution

January 31, 2018

1. (2 points) Find the derivative of $f(x) = x \cos x + e^x - 4x + 7$.

Solution: First, let's find the derivative of $x \cos x$ using the product rule. Notice that $\frac{d}{dx}[x] = 1$ and $\frac{d}{dx}[\cos x] = -\sin x$. So $\frac{d}{dx}[x\cos x] = 1 \cdot \cos x + x(-\sin x)$ $= \cos x - x \sin x$

Now we can find f'(x):

$$f'(x) = \frac{d}{dx} [x \cos x] + \frac{d}{dx} [e^x] - \frac{d}{dx} [4x] + \frac{d}{dx} [7]$$

= cos x - x sin x + e^x - 4

Answer: $f'(x) = \cos x - x \sin x + e^x - 4$

2. (2 points) The number of sales of Doo-Dads after t months is given by S(t) = 3t² + π³. In what month is the number of sales increasing at a rate of 24 units per month?
Solution: This question is asking us to find at what t value S'(t) = 24.

$$S'(t) = 6t + 0$$
 (since π^3 is a constant!)
= 6t

Now we set S'(t) equal to 24 and solve:

$$6t = 24$$
$$t = 4$$

So the number of sales is increasing at a rate of 24 units per month in the fourth month.

Answer: 4

3. (1 point) What is your favorite color? Answer: Answers will vary.