Quiz 8

Started: Nov 10 at 9:25am

Quiz Instructions

Choose the best solution choice for each multiple-choice problem. Each problem is worth two (2) points.

Question 1	2 pts

A particle is moving along the graph of $y = 4 - x^2$ in such a way that $\dfrac{dx}{dt} = 3$. Find $\dfrac{dy}{dt}$ when $x = 2$.

○ 3

○ −4

○ 0

✳ −12

Handwritten:
$$\frac{dy}{dt} = 0 - 2x\frac{dx}{dt}$$

$$\frac{dy}{dt} = -2x\frac{dx}{dt}$$

$$\frac{dy}{dt}\Big|_{x=2} = -2(2)(3) = \boxed{-12}$$

Question 2	2 pts

Given the following information, find and use the linearization (a.k.a, the tangent line approximation) of f at $x = 2$ to approximate $f(1.9)$.

$f(1) = 7.8, \quad f'(1) = -1.4, \quad f(2) = 6.5, \quad f'(2) = -0.9$

○ $f(1.9) \approx 7.40$

○ $f(1.9) \approx 6.41$

✳ $f(1.9) \approx 6.59$

○ $f(1.9) \approx 7.05$

Handwritten:
$$L(x) = f(2) + f'(2)(x-2)$$
$$= 6.5 - 0.9(x-2)$$

$$f(1.9) \approx L(1.9) = 6.5 - 0.9(-0.1)$$
$$= 6.59$$

Question 3	2 pts

Let $y = \sin x$. Use differentials to approximate Δy when $x = 0$ and $\Delta x = 0.12$.

✱ $\Delta y \approx 0.12$

○ $\Delta y \approx 0.00209$

○ $\Delta y \approx 0.09$

○ $\Delta y \approx 0.1197$

$$dy = \cos x \, dx$$
$$\Delta y \approx \cos x \, \Delta x$$
$$x = 0, \ \Delta x = 0.12 \implies \Delta y \approx \cos(0)(0.12)$$
$$= 0.12$$

Question 4

2 pts

Suppose you were to use calculus techniques (i.e., those from the **lecture 22 notes** ⬀ **(http://stevekifowit.com/archives/M131/lect22.pdf)**) to find the absolute extreme values of $f(x) = 3x^4 - 4x^3$ on the interval $[-1, 2]$. Which of these function values would be required in order for you to draw your conclusions?

✱ $f(-1)$, $f(0)$, $f(1)$, $f(2)$, and no other values

○ $f(-1)$, $f(0)$, $f(2)$, and no other values

○ $f(-1)$, $f(-0.5)$, $f(0)$, $f(0.5)$, $f(1)$, $f(1.5)$, $f(2)$, and no other values

○ $f(-1)$, $f(2)$, and no other values

$$f'(x) = 12x^3 - 12x^2$$
$$= 12x^2(x-1) = 0$$
$$x = 0, \ x = 1$$
$$\underbrace{\qquad}_{\text{CRIT #'s}}$$

END PTS ARE -1 & 2.

Question 5

2 pts

Suppose the function f is defined for all real numbers unless otherwise indicated in the table below. Which x-values in the table are critical numbers of f. DNE means "does not exist."

x	$f(x)$	$f'(x)$
0	DNE	DNE
2	7	DNE
5	13	0
8	0	-1
9	-5	0
10	DNE	DNE

✱ $x = 2$, $x = 5$, $x = 9$

○ $x = 5$, $x = 9$

○ $\boxed{x = 0,}$ $x = 2$, $x = 5$, $x = 9$, $\boxed{x = 10}$

○ $x = 0$, $x = 2$, $x = 10$

NOT CRIT #'s BECAUSE f IS NOT DEFINED THERE.