

Quiz 7

① This is a preview of the published version of the quiz

Started: Nov 1 at 9:09pm

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 $\frac{dx}{dt} = 3$. Find $\frac{dy}{dt}$ when $x = 2$.

0

-4

-12

3

$$y = 4 - x^2$$

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

$$\left. \frac{dy}{dx} \right|_{x=2} = (-2)(2)(3) = \boxed{-12}$$

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 $f(1.9)$.

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

$f(1.9) \approx 7.05$

$f(1.9) \approx 6.41$

$f(1.9) \approx 6.59$

$$L(x) = f(a) + f'(a)(x-a)$$

$$= 6.5 + (-0.9)(x-2)$$

$$L(x) = 6.5 - 0.9(x-2)$$

$$L(1.9) = 6.5 - 0.9(-0.1) = 6.5 + 0.09 = \boxed{6.59}$$

$f(1.9) \approx 7.40$

Question 3

2 pts

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

$\Delta y \approx 0.12$

$\Delta y \approx 0.1197$

$\Delta y \approx 0.09$

$\Delta y \approx 0.00209$

$$dy = \cos x dx$$

$$\Delta y \approx \cos x \Delta x$$

$$\text{WHEN } x = 0 \text{ AND } \Delta x = 0.12$$

$$\Delta y \approx \cos(0) \cdot 0.12$$

$$= 0.12$$

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) \rightarrow <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

$f(-1), f(2)$, 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

$$f'(x) = 12x^3 - 12x^2 \\ = 12x^2(x-1)$$

$$\text{CRIT. \#}'s \text{ ARE } x = 0 \ \& \ x = 1$$

$$\text{ENDPTS ARE } x = -1 \ \& \ x = 2$$

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

$x = 0, x = 2, x = 5, x = 9, x = 10$

$x = 2, x = 5, x = 9$

$x = 0, x = 2, x = 10$

$x = 5, x = 9$

CRIT #'s ARE INTERIOR PTS IN THE
DOMAIN OF f WHERE $f'(x) = 0$ OR
 $f'(x)$ DNE.

Quiz saved at 9:09pm

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