Quiz 4

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

Started: Sep 27 at 9:34pm

Quiz Instructions

Choose the best solution choice for each multiple-choice problem. For problems that require an exact numerical answer, the answer will always be an integer. The problems vary in value from 1 to 2 points.

Question 1

1 pts

Use basic differentiation rules to determine $f'(x)$.

$f(x) = 4x^3 - 5x^2 + 7x - 9$

$f'(x) = 12x^2 - 10x + 7 - 0$

- ○ $f'(x) = 12x^2 - 10x + 7x$
- ○ $f'(x) = 4x^2 - 5x + 7$
- ○ $f'(x) = 12x^2 - 10x - 2$
- ✗ $f'(x) = 12x^2 - 10x + 7$

Question 2

1 pts

Use basic differentiation rules to determine $\frac{dy}{dx}$.

$y = \frac{1}{x}$

$y = x^{-1} \Rightarrow \frac{dy}{dx} = -1x^{-2} = \frac{-1}{x^2}$

- ○ $\frac{dy}{dx} = \frac{1}{1}$
- ○ The derivative does not exist.

- [x] $\frac{dy}{dx} = -\frac{1}{x^2}$
- [ ] $\frac{dy}{dx} = \frac{1}{x^2}$

Question 3

2 pts

Find an equation of the line tangent to the graph of $y = \sin x$ at the point where $x = 0$.

Slope: $\frac{dy}{dx} = \cos x$

$m = \left.\frac{dy}{dx}\right|_{x=0} = \cos 0 = 1$

- [ ] $y = \pi x$
- [x] $y = x$
- [ ] $y = x - 1$
- [ ] There is no tangent line at $x = 0$.

Point: $x = 0 \Rightarrow y = \sin 0 = 0 \Rightarrow (0, 0)$

Tan line is $y = 1x + 0$ or $y = x$

Question 4

1 pts

Let $h(x) = 2\,g(x)\,f(x)$. Given the following information, compute $h'(2)$.

$f'(0) = 7, \quad f(2) = -4, \quad f'(2) = 8, \quad g(0) = 0, \quad g(2) = -5, \quad g'(2) = 9$

$h'(x) = 2g'(x)f(x) + 2g(x)f'(x)$

Write your exact numerical answer in the box below.

$h'(2) = 2g'(2)f(2) + 2g(2)f'(2)$

$= (2)(9)(-4) + 2(-5)(8)$

$= -72 + -80 = -152$

-152

Question 5

1 pts

Let $h(x) = \dfrac{f(x)}{x}$. Given the following information, compute $h'(2)$.

$h'(x) = \dfrac{x f'(x) - f(x)\,(1)}{x^2}$; $h'(2) = \dfrac{2f'(2) - f(2)}{2^2}$

$= \dfrac{2(8) - (-4)}{4} = \dfrac{20}{4}$

$= 5$

$f'(0) = 7, \quad f(2) = -4, \quad f'(2) = 8, \quad g(0) = 0, \quad g(2) = -5, \quad g'(2) = 9$

Write your exact numerical answer in the box below.

5

Question 6

1 pts

Use differentiation rules to determine $\dfrac{d^3y}{dx^3}$.

$y = x^5 + 6x^3 - \cos x$

$\dfrac{dy}{dx} = 5x^4 + 18x^2 + \sin x$

$\dfrac{d^2y}{dx^2} = 20x^3 + 36x + \cos x$

$\dfrac{d^3y}{dx^3} = 60x^2 + 36 - \sin x$

- ○ $\dfrac{d^3y}{dx^3} = 5x^4 + 18x^2 + \sin x$
- ✗ $\dfrac{d^3y}{dx^3} = 60x^2 + 36 - \sin x$
- ○ $\dfrac{d^3y}{dx^3} = 60x + 36 - \cos x$
- ○ $\dfrac{d^3y}{dx^3} = 60x^2 + 36x + \sin x$

Question 7

1 pts

Use differentiation rules to determine $g'(x)$.

$g(x) = x^2 \cot x$

$g'(x) = 2x \cot x + x^2(-\csc^2 x)$

- [x] $g'(x) = 2x \cot x - x^2 \csc^2 x$
- [ ] $g'(x) = 2x \cot^2 x - 2x \csc^2 x$
- [ ] $g'(x) = -2x \csc^2 x$
- [ ] $g'(x) = 2x(1 + \cot^2 x) - x^2 \csc^2 x$

Question 8

2 pts

An object is launched upwards with an initial speed of 32 feet per second from an initial height of 48 feet. If we ignore all forces except gravity, the height of the object (in feet) at any time t is given by

$$H(t) = -16t^2 + 32t + 48.$$

Find the **speed** of the object when it hits the ground. Write your exact answer in the box below. Do not include units. (Your answer should be a positive number!)

64

$H(t) = 0 \Rightarrow -16(t^2 - 2t - 3) = 0$

$-16(t-3)(t+1) = 0$

$t = 3$ WHEN HITS GROUND.

$H'(t) = -32t + 32$

$H'(3) = -32(3) + 32$

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$= -64$

Speed $= 64$ FT/S