Quiz 5

Started: Oct 3 at 11:43am

Quiz Instructions

All problems on this quiz require an exact numerical answer or a file submission. For the problems that require an exact numerical answer, the answer will always be an integer. For the two problems that require a file submission, show all work and submit your solution as a pdf, jpg, or png file:

Question 1

1 pts

Let $h(x) = (f(x))^3$. Given the following information, compute $h'(1)$.

$$f(0) = 4, \quad f'(0) = -2, \quad f(1) = 2, \quad f'(1) = 6, \quad f(2) = 5, \quad f'(2) = -9$$

Write your exact numerical answer in the box below.

72

$$h'(x) = 3[f(x)]^2 f'(x)$$
$$h'(1) = 3[f(1)]^2 f'(1) = 3(2)^2 6 = \boxed{72}$$

Question 2

1 pts

Let $h(x) = g(f(x))$, and notice that h is a composition of the two functions g and f. Given the following information, compute $h'(2)$.

$$f(2) = 3, \quad f'(2) = 8, \quad g'(0) = 0, \quad g'(2) = -5, \quad g'(3) = 9$$

Write your exact numerical answer in the box below.

72

$$h'(x) = g'(f(x)) f'(x)$$
$$h'(2) = g'(f(2)) f'(2)$$
$$= g'(3)(8) = (9)(8) = \boxed{72}$$

Question 3

1 pts

What is the slope of the line tangent to the graph of $y = \sqrt{x^2 - 12}$ at the point where $x = 4$.

$$y = \sqrt{x^2 - 12} = (x^2 - 12)^{1/2}$$

$$\frac{dy}{dx} = \frac{1}{2}(x^2 - 12)^{-1/2}(2x)$$

Write your exact numerical answer in the box below.

2

$$\frac{dy}{dx}\Big|_{4} = \frac{1}{2}(4)^{-1/2}(8) = \boxed{2}$$

Question 4

2 pts

Solve the following problem on paper, showing all work. Then submit your work as a pdf, jpg, or png file.

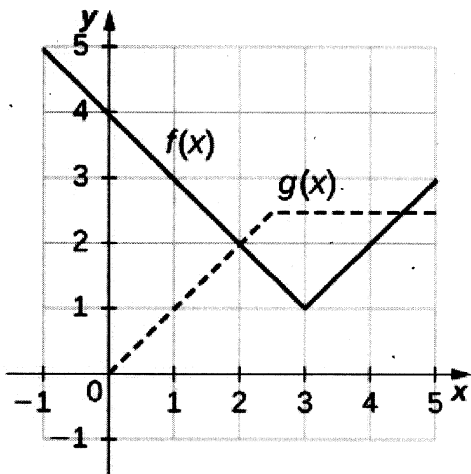Let $f(x) = \tan(\pi x^2 + x)$. Use our differentiation rules to determine $f'(x)$.

By THE CHAIN RULE, $f'(x) = \sec^2(\pi x^2 + x) \cdot \frac{d}{dx}(\pi x^2 + x)$

$$= \boxed{\sec^2(\pi x^2 + x) \cdot (2\pi x + 1)}$$

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Question 5

1 pts

The graphs of f and g are shown below. Use the chain rule and information from the graphs to determine the derivative of $g(f(x))$ when $x = 1$.

$$g'(f(1))\, f'(1)$$

$$= g'(3)(-1)$$

$$= (0)(-1) = \boxed{0}$$

Write your exact numerical answer in the box below.

0

Question 6

4 pts

Solve the following problem on paper, **showing all work**. Then submit your work as a pdf, jpg, or png file.

Given the equation $x^3 + 8xy + y^3 = 25x$, use implicit differentiation to determine $\dfrac{dy}{dx}$ at the point $(x, y) = (1, 2)$.

See below.

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$$\frac{d}{dx}\left(x^3 + 8xy + y^3\right) = \frac{d}{dx}(25x)$$

$$3x^2 + 8y + 8x\frac{dy}{dx} + 3y^2\frac{dy}{dx} = 25$$

$$\left(8x + 3y^2\right)\frac{dy}{dx} = 25 - 3x^2 - 8y$$

$$\frac{dy}{dx} = \frac{25 - 3x^2 - 8y}{8x + 3y^2}$$

$$\frac{dy}{dx}\bigg|_{(x,y)=(1,2)} = \frac{25 - 3(1)^2 - 8(2)}{8(1) + 3(2)^2} = \frac{25 - 3 - 16}{8 + 12} = \frac{6}{20}$$

$$= \boxed{\frac{3}{10}}$$