Math 131 - Quiz 7

Name key

October 15, 2025

Score _____

Show all work to receive credit. Supply explanations where necessary.

1. (2 points) Let $h(x) = \tan^5 x$. Find two functions f and g so that $h(x) = f(g(x))$.

$f(x) = x^5$ $\qquad \tan^5 x = (\tan x)^5$

$g(x) = \tan x$

2. (6 points) Find the derivative of each function.

(a) $f(x) = \sqrt{x^4+1} = (x^4+1)^{1/2}$

$$f'(x) = \frac{1}{2}(x^4+1)^{-1/2}(4x^3) = \frac{2x^3}{\sqrt{x^4+1}}$$

(b) $y = \cos(5x^2)$

$$\frac{dy}{dx} = -\sin(5x^2)(10x) = -10x\sin(5x^2)$$

(c) $g(x) = (x^2 \sin x)^7$

$$g'(x) = 7(x^2\sin x)^6 \cdot \frac{d}{dx}(x^2\sin x)$$

$$= 7(x^2\sin x)^6(2x\sin x + x^2\cos x)$$

3. (2 points) Find an equation of the line tangent to the graph of $y = (3x-5)^4$ at the point where $x = 1$.

Slope

$\frac{dy}{dx} = 4(3x-5)^3(3)$

$m = \left.\frac{dy}{dx}\right|_{x=1} = 4(-2)^3(3)$

$= -96$

Point:

$x = 1, \; y = (-2)^4$

$= 16$

$(1, 16)$

Tangent line:

$y - 16 = -96(x-1)$

or

$y = -96x + 112$