

Math 171 - Quiz 5

October 2, 2014

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (2 points) Differentiate. Do not simplify. $\frac{d}{dx} \left[\frac{\tan x}{x^4 + 5x^2} \right]$

$$= \frac{(x^4 + 5x^2)(\sec^2 x) - (\tan x)(4x^3 + 10x)}{(x^4 + 5x^2)^2}$$

2. (2 points) Differentiate. Do not simplify. $\frac{d}{dx} [(x^2 + 2x + 3) \cos x]$

$$= (2x + 2) \cos x + (x^2 + 2x + 3)(-\sin x)$$

3. (2 points) State the chain rule.

$$\frac{d}{dx} f(g(x)) = f'(g(x)) g'(x)$$

4. (2 points) Find the slope of the line tangent to the graph of $y = \sqrt{x^3 - x - 2}$ at the point where $x = 2$.

$$\frac{dy}{dx} = \frac{1}{2} (x^3 - x - 2)^{-1/2} (3x^2 - 1) \quad \frac{dy}{dx} \Big|_{x=2} = \frac{1}{2} (4)^{-1/2} (11) = \boxed{\frac{11}{4}}$$

5. (2 points) Differentiate. $\frac{d}{d\theta} \sin^2(3\pi\theta)$

$$= 2 \sin(3\pi\theta) \cdot \frac{d}{d\theta} \sin(3\pi\theta)$$

$$= 2 \sin(3\pi\theta) \cos(3\pi\theta) (3\pi)$$