Math 105
Quiz 4
10/26/12

Name SOLUTIONS

Read directions carefully and *show your work*. Partial credit will be assigned based upon the correctness, completeness, and clarity of your answers.

1. (3 pts) Find $f'(t)$ if $f(t) = t^2 \cdot \ln(\sin t)$.

Use product & chain rule

$f'(t) = 2t \ln(\sin t) + t^2 \cdot \frac{1}{\sin t} \cdot \cos t$

$= \boxed{2t \ln(\sin t) + \frac{t^2 \cos t}{\sin t}}$

2. (3 pts) Consider $y(x) = \sqrt{1 - \sqrt{x}}$, find $\frac{dy}{dx}$. Express your answer without using negative exponents.

Use chain rule

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

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

$= \frac{1}{2\sqrt{1-\sqrt{x}}} \cdot (-\frac{1}{2} x^{-1/2})$

$= \frac{1}{2\sqrt{1-\sqrt{x}}} \cdot \frac{-1}{2\sqrt{x}}$

$\boxed{\frac{dy}{dx} = \frac{-1}{4\sqrt{x}\sqrt{1-\sqrt{x}}}}$

3. (4 pts) Find $\frac{dy}{dx}$ when $\sin y + x^2 y + y^3 = x^2$.

Use implicit differentiation

$\cos y \cdot \frac{dy}{dx} + 2xy + x^2 \frac{dy}{dx} + 3y^2 \frac{dy}{dx} = 2x$

$\cos y \frac{dy}{dx} + x^2 \frac{dy}{dx} + 3y^2 \frac{dy}{dx} = 2x - 2xy$

$\frac{dy}{dx}(\cos y + x^2 + 3y^2) = 2x(1-y)$

$\boxed{\frac{dy}{dx} = \frac{2x(1-y)}{\cos y + x^2 + 3y^2}}$