Quiz 5 Solution - Math 165

Name: _____

Show all work to receive maximum credit for each problem. You may not use your book, notes, or a calculator on this quiz.

1. (4 points) Let $y = 3\sin(7t)$. Find $\dfrac{d^3y}{dt^3}$.

   $\dfrac{dy}{dx} = 3(7)\cos(7t)$
   $\dfrac{d^2y}{dx^2} = -3(7)(7)\sin(7t)$
   $\dfrac{d^3y}{dx^3} = -3(7)(7)(7)\cos(7t)$

2. (3 points) Use implicit differentiation to find $\dfrac{dy}{dx}$ if $7xy + y^2 = 1$.

   $\dfrac{d}{dx}(7xy + y^2) = \dfrac{d}{dx}(1) \Rightarrow 7y + 7x\frac{dy}{dx} + 2y\frac{dy}{dx} = 0 \Rightarrow \dfrac{dy}{dx} = \dfrac{-7y}{7x + 2y}$

3. (3 points) Use implicit differentiation to find $\dfrac{dy}{dx}$ if $\cos(xy) - 3y = \sin(x)$.

   $\dfrac{d}{dx}(\cos(xy) - 3y) = \dfrac{d}{dx}(\sin(x)) \Rightarrow -\sin(xy)[y + x\frac{dy}{dx}] - 3\frac{dy}{dx} = \cos(x) \Rightarrow \dfrac{dy}{dx} = \dfrac{\cos(x) + y\sin(xy)}{-x\sin(xy) - 3}$