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MATH 141: QUIZ 6 SECTIONS 3.7 AND 3.8

Name and Section: _____

No phone or calculator. You must show all work to receive full credit. Simplify your coefficients when applicable.

1. **(5 points)** Use implicit differentiation to find $\frac{dy}{dx}$:

$$(3xy+7)^2 = 6y$$

3 $2(3xy+7)\left(3y + 3x\frac{dy}{dx}\right) = 6\frac{dy}{dx}$

$(6xy+14)\left(3y + 3x\frac{dy}{dx}\right) = 6\frac{dy}{dx}$

$18xy^2 + 18x^2y\frac{dy}{dx} + 42y + 42x\frac{dy}{dx} = 6\frac{dy}{dx}$

$18x^2y\frac{dy}{dx} + 42x\frac{dy}{dx} - 6\frac{dy}{dx} = -18xy^2 - 42y$

$\frac{dy}{dx}(18x^2y + 42x - 6) = -18xy^2 - 42y$

2 $\frac{dy}{dx} = \frac{-18xy^2 - 42y}{18x^2y + 42x - 6}$

Date: October 25, 2017.

2. **(5 points)** Use logarithmic differentiation to find y':

$$y = x^{\sin x}$$

2 $\ln(y) = \ln(x^{\sin x})$

$\ln(y) = \sin x \ln(x)$

2 $\frac{1}{y}\frac{dy}{dx} = \cos x \ln(x) + \frac{\sin(x)}{x}$

$\frac{dy}{dx} = y\left(\cos(x)\ln(x) + \frac{\sin(x)}{x}\right)$

1 $\frac{dy}{dx} = x^{\sin x}\left(\cos(x)\ln(x) + \frac{\sin(x)}{x}\right)$