Math 171A
Fall 2009
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Differential Calculus
Quiz 4
Write your name on this quiz

1. Calculate $f'(x)$ if $f(x) = \sqrt{\dfrac{x^3+2x}{\sin(3x)}}$.

$$f'(x) = \frac{d}{dx}\left(\left(\frac{x^3+2x}{\sin 3x}\right)^{1/2}\right) =$$

$$\frac{1}{2}\left(\frac{x^3+2x}{\sin 3x}\right)^{-1/2} \cdot \left[\frac{(3x^2+2)\sin 3x - (x^3+2x)\cdot 3\cdot \cos 3x}{(\sin 3x)^2}\right]$$

2. Calculate dy/dx if y is defined implicitly by the equation $xy = \cos(xy)$.

$$\frac{d}{dx}(xy) = \frac{d}{dx}\cos(xy)$$

$$\downarrow$$

$$y + x\frac{dy}{dx} = -\sin(xy)\cdot\left[y + x\frac{dy}{dx}\right]$$

$$\downarrow$$

$$\left[y + x\frac{dy}{dx}\right]\cdot\left(1+\sin(xy)\right) = 0 \rightarrow \begin{cases} y + x\frac{dy}{dx} = 0 \\ \text{or} \\ \sin(xy) = -1 \end{cases}$$

$$\boxed{\frac{dy}{dx} = -\frac{y}{x}}$$