MAT 136 (Calculus I), Quiz 5, Prof. Jim Swift

No notes, no computers. Do your own work Name: key

Differentiate these five functions. Your answer should be a complete sentence, for example $f'(x) = \cdots$ or $\frac{dy}{dx} = \cdots$. You do not have to simplify your answer.

1. $f(x) = x^2 + 3x - 1$

$f'(x) = 2x + 3$

2. $g(x) = xe^{-2x}$

$g'(x) = \frac{d}{dx}[x] \cdot e^{-2x} + x \frac{d}{dx}[e^{-2x}]$

$= 1 \cdot e^{-2x} + x e^{-2x} \frac{d}{dx}[-2x] = e^{-2x} + x e^{-2x}(-2)$

3. $y = \frac{x}{x^2+1}$.

$\frac{dy}{dx} = \frac{\frac{d}{dx}[x] \cdot (x^2+1) - x \frac{d}{dx}[x^2+1]}{(x^2+1)^2} = \frac{1 \cdot (x^2+1) - x \cdot 2x}{(x^2+1)^2}$ OK.

$= \frac{x^2+1-2x^2}{(x^2+1)^2} = \frac{1-x^2}{(x^2+1)^2}$

all 3 are OK.

4. $f(x) = \cos\left(\sqrt{x}\right)$

OK

$f'(x) = -\sin(\sqrt{x}) \cdot \frac{d}{dx}\left[x^{\frac{1}{2}}\right] = -\sin(\sqrt{x}) \cdot \frac{1}{2} x^{-\frac{1}{2}}$

$= \frac{-\sin(\sqrt{x})}{2\sqrt{x}}$ OK too

5. $y = \ln|x^2 - 1|$

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

$= \frac{1}{x^2-1} \cdot 2x$ OK →