Solutions to the "QUIZ" for Sept. 29, 2008

1. Find the first, second, and third derivatives of the function $f(x) = x^3 + 2x + 6e^x$.

Solution: $f'(x) = 3x^2 + 2 + 6e^x$, $f''(x) = 6x + 6e^x$, $f'''(x) = 6 + 6e^x = 6(1 + e^x)$.

Comments: Almost everyone got it right.

2. Differentiate

$$y = \frac{2 + \sin x}{1 + 2\cos x} \quad .$$

Solution

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

$$= \frac{\cos x(1 + 2\cos x) - (-2\sin x)(2 + \sin x)}{(1 + 2\cos x)^2} = \frac{\cos x + 2\cos^2 x + 4\sin x + 2\sin^2 x}{(1 + 2\cos x)^2}$$

$$= \frac{\cos x + 4\sin x + 2(\cos^2 x + \sin^2 x)}{(1 + 2\cos x)^2} = \frac{\cos x + 4\sin x + 2}{(1 + 2\cos x)^2} \quad .$$

Ans.: $f'(x) = \frac{\cos x + 4\sin x + 2}{(1+2\cos x)^2}$

Comment: About %60 got it perfectly. Most people set-up the quotient rule correctly, but some messed up the algebra and the trig. Surprisingly many people "simplified" $2\cos^2 x + 2\sin^2 x$ to 1. It should be 2 of course. Whatch out!