Quiz 4 – MA 123F – Tuesday, Oct. 5, 2010

Name:

Show your work.

(1) Let $y = \dfrac{5e^x}{x}$. Find y' and y''.

(2) Let $f(x) = \dfrac{e^x}{(1+e^x)}$. Find $f'(x)$ and $f'(0)$.

(3) Find $\dfrac{d}{dx}\left(\left(6\sqrt{x} - \dfrac{3}{\sqrt{x}}\right)e^x\right)$.

(4) Find $\dfrac{d}{dx}\left(\dfrac{x^{3/2}}{e^x}\right)$.

Solutions to Quiz 4 - MA123F

(1) $\frac{d}{dx}\left(\frac{5e^x}{x}\right) = \frac{x\cdot 5e^x - 5e^x\cdot 1}{x^2} = \boxed{\frac{5e^x(x-1)}{x^2}}$

$\frac{d^2}{dx^2}\left(\frac{5e^x}{x}\right) = \frac{d}{dx}\left(\frac{5e^x(x-1)}{x^2}\right) = \frac{x^2(5e^x\cdot 1 + (x-1)\cdot 5e^x) - 5e^x(x-1)\cdot 2x}{x^4}$

$= \boxed{\frac{5e^x(x^2-2x+2)}{x^3}}$

(2) $\frac{d}{dx}\left(\frac{e^x}{1+e^x}\right) = \frac{(1+e^x)\cdot e^x - e^x\cdot e^x}{(1+e^x)^2} = \boxed{\frac{e^x}{(1+e^x)^2}}$

$f'(0) = \frac{1}{(1+1)^2} = \boxed{\frac{1}{4}}$

(3) $\frac{d}{dx}\left((6\sqrt{x} - \frac{3}{\sqrt{x}})e^x\right) = \frac{d}{dx}\left(6\sqrt{x}\,e^x - 3e^x x^{-1/2}\right) = 6\sqrt{x}\,e^x + e^x\cdot\left(\frac{6}{2\sqrt{x}}\right)$

$-\left(3e^x\cdot\left(\frac{-1}{2x^{3/2}}\right) + x^{-1/2}\cdot 3e^x\right)$

$= \boxed{3e^x\left(2\sqrt{x} + \frac{1}{2x^{3/2}}\right)}$

(4) $\frac{d}{dx}\left(\frac{x^{3/2}}{e^x}\right) = \frac{e^x\cdot\frac{3}{2}x^{1/2} - x^{3/2}\cdot e^x}{e^{2x}} = \boxed{\frac{\sqrt{x}}{e^x}\left(\frac{3}{2} - x\right)}$