Quiz - 2

1. $(xy + x + 3y + 3) \frac{dy}{dx} = (x+1)(y+2)y$

$\frac{dy}{dx} = \frac{(x+1)(y+2)y}{(x+3)(y+1)} \rightarrow \int \frac{y+1}{y(y+2)} dy = \int \frac{x+1}{x+3} dx$

$\int \frac{1}{2(y+2)} + \frac{1}{2y} dy = \int (1 - \frac{2}{x+3}) dx$

$\frac{1}{2}[\log y + \log(y+2)] = x - 2\log(x+3)$

$\log(y(y+2)) = 2x - 4\log(x+3)$

$\log(y(y+2)(x+3)^4) = 2x$

$y(y+2) = \frac{e^{2x}}{(x+3)^4}$ #

2. Find $\lim\limits_{x \to 0^+} (\sin x)^x$

$y = (\sin x)^x$

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

2. $\lim\limits_{x \to 0^+} (\sin x)^x \rightarrow y = (\sin x)^x \rightarrow \ln y = x \ln(\sin x) = \frac{\ln(\sin x)}{\frac{1}{x}}$

$\lim\limits_{x \to 0^+} \ln y = \lim\limits_{x \to 0^+} \frac{\ln(\sin x)}{\frac{1}{x}}$

$L'H: = \lim\limits_{x \to 0^+} \frac{\cos x}{\sin(x)} \cdot (-x^2)$

$L'H: = \lim\limits_{x \to 0^+} \frac{-x^2 \sin(x) - 2x \cos(x)}{\cos x}$

$\lim\limits_{x \to 0^+} \ln y = 0$

$\therefore y = e^0 = 1$ #