October 3,2011

Test♯1 Math202, sec 10, **Time allowed: 35 minutes**

Name: **ID ♯:** **Serial:**

Exercise1: (07pts)

Solve the DE: $\cos^2 x \sin x \frac{dy}{dx} + \cos^3 x\, y = 1$

S.F: $\frac{dy}{dx} + \frac{\cos x}{\sin x} y = \frac{1}{\cos^2 x \sin x}$ (01) $\Rightarrow$ I.F: $e^{\int \frac{\cos x}{\sin x} dx} = e^{\ln|\sin x|} = \sin x$ (01)

Thus: $\sin x \frac{dy}{dx} + \cos x\, y = \frac{1}{\cos^2 x}$ (01) $= \frac{d}{dx}[\sin x\, y] = \frac{d}{dx}(\tan x)$ (01)

Hence $\sin x\, y = \tan x + C \Rightarrow y = \frac{1}{\cos x} + \frac{C}{\sin x}$ (01)

$\Rightarrow$ $\boxed{y = \sec x + C \csc x}$ (01)

Exercise2: (06pts)

Solve the initial value problem:

$(xy - 2x)\,dx - (xy + y)\,dy = 0$, $y(0) = 3$.

$x(y-2)\,dx - y(x+1)\,dx = 0$ (01) : Dividing Both sides by $(y-2)(x-1) \Rightarrow$

$\frac{x}{x+1} dx - \frac{y}{y-2} dy = 0 = \left(1 - \frac{1}{x+1}\right) dx - \left(1 + \frac{2}{y-2}\right) dy$ (01) (01) Integr. $\Rightarrow$

$x - \ln|x+1| - y - 2\ln|y-2| = c$ (01)

Now $y(0) = 3 \Rightarrow c = -3$ (01)

Hence $\boxed{x - \ln|x+1| - y - 2\ln|y-2| = -3}$ (01)