Math 260 Quiz # 2

Name: Solution I.D. # _____ Ser. # ____

1. In each of the following DE determine if it is separable, linear or none:

(a) $y^3\frac{dy}{dx} = (y^4+1)\cos x$

$\frac{dy}{dx} = \frac{y^4+1}{y^3}\cos x = g(y)f(x) \Longrightarrow$ Separable

(b) $(x^2-4x-3xy+4)dx = (x^2-x-2)dy$

$\frac{dy}{dx} = \frac{x^2-4x-3xy+4}{x^2-x-2} \Rightarrow \frac{dy}{dx} - \frac{3x}{x^2-x-2}y + \frac{x^2-4x+4}{x^2-x-2} = 0 \Rightarrow$ Linear

(c) $(\cos x)y''' - (\sin x)y' - 8 = 0$

Linear

2. Solve the following initial value problem: $y' = y\cos x - xy$, $y(\pi) = 1$

$\frac{dy}{dx} = y(\cos x - x)$

$\frac{dy}{y} = (\cos x - x)dx$

Integrate to get:

$\ln|y| = \sin x - \frac{x^2}{2} + C$ or $\ln y = \sin x - \frac{x^2}{2} + C$

Use the initial condition $y(\pi) = 1 \Rightarrow C = \frac{\pi^2}{2}$

∴ the solution is $\ln y = \sin x - \frac{x^2}{2} + \frac{\pi^2}{2}$

$y = e^{\sin x + \frac{\pi^2 - x^2}{2}}$