Math 260   Quiz # 2b

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

1. Solve the following initial value problem: $y' = y\cos x - xy$, $y(0) = 1$

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

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

Integrate:

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

use the initial condition $y(0) = 1 \Rightarrow C = 0$

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

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

2. Find the position function $x(t)$ of a moving particle with acceleration $a(t) = 7 \text{m/sec}^2$
   if its initial position is 12m and its initial velocity is 2m/sec.

$$a(t) = 7, \quad V_0 = 2, \quad X_0 = 12$$

$$V(t) = \int 7 \, dt = 7t + V_0 = 7t + 2$$

$$X(t) = \int (7t + 2) \, dt = \frac{7}{2}t^2 + 2t + X_0$$

$$= \frac{7}{2}t^2 + 2t + 12$$

∴ the position function is

$$X(t) = \frac{7}{2}t^2 + 2t + 12$$