7 - C

Math 260 Quiz # 1

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

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

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

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

Integrating we get,

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

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

Hence the solution is $\ln y = \sin x - \frac{x^2}{2}$ i.e. $y = e^{\sin x - \frac{x^2}{2}}$

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.

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

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

$$x(t) = \int (7t+2)\,dt = \frac{7}{2}t^2 + 2t + x_0$$

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

∴ the position function is $x(t) = \frac{7}{2}t^2 + 2t + 12$