$$\sin x\, y = -x\cos x + \sin x + C$$

$y(\pi/2) = 2 \Rightarrow$

$$(\sin \pi/2)\cdot 2 = -\pi/2 \cos \pi/2 + \sin \pi/2 + C$$

$$2 = 0 + 1 + C$$

$$C = 1.$$

So

$$y = \frac{1 + \sin x - x\cos x}{\sin x}, \quad \text{for } 0 < x < \pi.$$

<u>Existence & Uniqueness Theorem for 1st order linear DES.</u>

Let $P(x)$, $Q(x)$ be continuous functions on the open interval (a,b) which contains x_0.

Then the IVP

$$\frac{dy}{dx} + P(x)y = Q(x), \qquad y(x_0) = y_0$$

has a unique solution on the interval (a,b).