Q1. Substitute $y = e^{rx}$ in $y'' - y' - 2y = 0$ and determine all values of $r$ for which $y = e^{rx}$ is a solution of the differential equation.

Q2. Time rate of change of a function $f(t)$ is proportional to cube root of $f(t)$. Write a differential equation which represents this situation.

Q3. Find an explicit solution of the IVP $\frac{dy}{dx} = xy; \quad y(0) = 4$. 
Q4. Solve the IVP: \( \frac{2}{dx} \frac{dy}{dx} + \frac{2}{x} y = \frac{e^x}{2x} \quad y(1) = 2 \)