Q No. 1: Verify by substitution that $y(x) = (x - 1)^2 + C(x - 1)^{-1}$ is a one parameter family of solution of a first order differential equation $(x - 1) \frac{dy}{dx} + y = 3(x - 1)^2, \quad x > 1.$

Q2. Solve the first order IVP $\frac{dy}{dx} = \sin x \cos x$, such that $y(\pi/4) = 2.$
Q3. Solve the DE \( \frac{dy}{dx} = x + xy^2 \), with \( y > 0 \).

Q4. Initially number of chicks was 100. In two months the number grew to 200. How long it will take the number to grow to 300? (Assume rate of growth is proportional to number of chicken present at time \( t \))