1. Solve the separable ODE \( yy' = (t - 1)e^{-y^2} \), and find the solution that satisfies the initial condition \( y(0) = 1 \). [5]

2. Consider the ODE \((e^{(x+y)} + ye^y) \, dx + (xe^y - 1) \, dy = 0\).
   
   (a) Show that the given ODE is not exact.
   
   (b) Show that \( e^{-y} \) is an integrating factor for the ODE.
   
   (c) Make the ODE exact by using the integrating factor given above and find its general solution. [3 + 2 + 5]

3. Solve the Bernoulli’s equation \( y' = y - 2y^2 \) and find the solution that satisfies the initial condition \( y(0) = 1 \). [4 + 1]

4. Find the general solution of the fourth order homogeneous linear ODE: \( y^{(4)} - 8y' = 0 \). [6]

5. If \( i, -i, -i, 2 + \sqrt{5} \) are the roots of the auxiliary equation of a linear homogeneous 5th order ODE with real coefficients, write the general solution of the ODE. [4]