**First Mid Term Exam Math 425**

**Question 1**

**a-Eliminate the arbitrary functions to obtain a differential equation of lowest order:**

$z=f\left(x+ct\right)+g\left(x-ct\right)$

**b- Show that** $u\left(x,y\right)=\frac{1}{4}(x+f\left(x-y\right))^{2}$ **is a solution of** $u\_{x}+u\_{y}=\sqrt{u}$

**Question2**

**Find the general solution of:**

**a-**$\left(z+e^{x}\right)z\_{x}+\left(z+e^{y}\right)z\_{y}=z^{2}-e^{x+y}.$

**b-**

**Question 3**

**a)Determine the integral surface which passes through the given curve:**

$x\left(y^{2}+z\right)z\_{x}-y\left(x^{2}+z\right)z\_{y}=\left(x^{2}-y^{2}\right)z which passes through x+y=0 and z=1.$

**b)**$ Find the general solution for: z\_{xx}-2z\_{xy}+z\_{yy}=4e^{3y}+cosx.$