EXERCIES-SHEET-1

(1) Find an interval on which the IVP

$$\sqrt{4-x^2}y^{''} - \frac{x}{3-x}y^{'} + y = 0, \quad y(0) = 1, y^{'}(0) = 0$$

has a unique solution on this interval.

(2) Find an interval on which the IVP

$$xe^{-x}y^{''} - \frac{x}{1+2x}y^{'} + (\ln x)\, y = 0, \quad y(2) = 0, y^{'}(2) = 1$$

has a unique solution on this interval.

(3) Find an interval on which the IVP

$$(\sin x)\, y^{''} - \frac{x}{1+\cos x}y^{'} + xy = 0, \quad y(\frac{\pi}{4}) = 0, y^{'}(\frac{\pi}{4}) = 1$$

has a unique solution on this interval.

(4) Find an interval on which the IVP

$$\left(x+x^2\right) y^{'''} - 5y^{'} + (\ln x)\, y = 0, \quad y(\frac{1}{2}) = 0, y^{'}(\frac{1}{2}) = 1, y^{''}(\frac{1}{2}) = -1$$

has a unique solution on this interval.