

**King Saud university**  
**College of Sciences**  
**Departement of Mathematics**

**Math 204**  
**Homework Assignment No 2**  
**Due date : 07/04/2008**

Question 1 ) Solve the differential equations by using an appropriate substitution

$$\frac{dy}{dx} = \frac{1 - x - y}{x + y}$$

Question 2) Solve the Initial Value Problem (IVP)

$$\begin{cases} ydx + (y \cos(\frac{x}{y}) - x)dy = 0 \\ y(0) = 2 \end{cases}$$

where  $y \neq 0$  on an interval I containing 0 .

Question 3) A cup is filled with tea at temperature  $75^{\circ}$  C. and is left in a room with air temperature  $25^{\circ}$  C, After 1 minute tea temperature drops to  $50^{\circ}$  C. What will be the temperature after 2 minutes ?. At what time will the temperature be  $40^{\circ}$  C ?

Question 4) The population of bacteria in culture grows a rate proportional to the number of bacteria present at time t. After 3 hours it is observed that 400 bacteria are present . After 10 hours 2000 bacteria are present .What was the initial number of bacteria

Question 5) Find the orthogonal trajectories of the given family of curves

$$y^2 = 4x^2(1 - Cx)$$

where C is an arbitrary constant such that  $C \neq 0$  and  $x \in I$  ,where I is an interval not containing 0 .

Question 6) If 0.5% of radium disappear in 10 yaers .Find what percentage will disappear in 1000 years . What is the half-life of radium ?.