1.   Consider a velocity field with

        u = y+t
        v = sin(t)

        (a) Find the streamline that paths through point (1,1) at different times.
        (b) Determine the path line of a particle which was at (1,1) at time t = 0.
        (c) Find the streak line of point (1,1) at time 1.
        (d) Evaluate the deformation rate tensor and vorticity vector in this flow field.

2   Consider an unsteady viscous liquid flowing between two parallel plates as shown.
        The plates are stationary.   The equation of motion of fluid velocity u(y,t) is given
        as

$$\frac{\partial u}{\partial t} = v\frac{\partial^2 u}{\partial y^2} + \sin \pi y$$
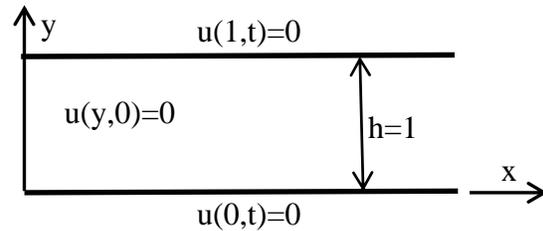
        Assuming unsteady fully developed flow starting from rest, evaluate the velocity
        u(y,t).