DIFFERENTIAL EQUATIONS II

COURSE WORK

1 (a). When are two functions $\mathbf{f_1(x)}$ and $\mathbf{f_2(x)}$ said to be orthogonal on an interval **[a, b].**
(b). Obtain the Fourier series expansion of $\boldsymbol{f(x) = \pi + x}$ for $\boldsymbol{-\pi < x < \pi}$. Hence, show that

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \text{------}$$

2. A bar of length 2m is fully insulated along its sides. It is initially at 10^0C and at t =0, the ends are plunged into ice and maintained at a temperature of 0^0C. Determine an expression for the temperature of a point P, a distance x from one end at any subsequent time t seconds after t =0.

Hint: $\frac{\partial^2 u}{\partial x^2} = \frac{1}{c^2}\frac{\partial u}{\partial t}$ with the boundary condition u(0,t) =0, u(2, t) =0, u(x,0) =10.

SUCCESS