Answer on Question #71939 – Physics – Electromagnetism

show that the function u(x,t) = e^-µt sin x is a solution of the one-dimensional heat equation

Solution: one-dimensional heat equation has the form:

$$\frac{\partial u}{\partial t} - \mu \frac{\partial^2 u}{dx^2} = 0.$$

Let us put this $u(x, t)$ into the equation:

$$\frac{\partial(e^{-\mu t} \sin x)}{\partial t} - \mu \frac{\partial^2(e^{-\mu t} \sin x)}{dx^2} = \sin x \frac{\partial(e^{-\mu t})}{\partial t} - \mu e^{-\mu t} \frac{\partial^2(\sin x)}{dx^2} = -\mu u(x, t) + \mu u(x, t)$$
$$= 0,$$

what means that this function actually is a solution.

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