A Piece
on Earth:
Some Practice with Some Math that Underlies Some Physics

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I. Derivatives.

Please solve the following:

a.

First, Assume:

$$x = A\cos(\omega t)$$

Then find:

$$\frac{dx}{dt} = ?$$

$$\frac{d^2x}{dt^2} = ?$$

is $x = A\cos(\omega t)$ **'a solution'** *to*

$$\frac{d^2x}{dt^2} = -(\omega^2)x?$$

Why or why not?

Now assume: $\boldsymbol{x = A\cos(5t)}$

Is x = A cos (5t) 'a solution' to

$\frac{d\hat{}2X}{dt\hat{}2} = -3x.$

Could there be conditions under which $x = A\cos(\omega t)$ *is* **'a solution'** *to*

$$\frac{d^2x}{dt^2} = -(\frac{K}{m})x?$$

What would these conditions be?

$$x = e^{-wt}$$

$$\frac{dx}{dt} = ?$$

$$\frac{d^2x}{dt^2} = ?$$

Is $x = e^{-wt}$ *a 'solution' to* $\frac{d^2x}{dt^2} = -(\omega^2)x$?

Why or why not?

Assume that $i \equiv \sqrt{-1}$.

and Let $x = e^{-iwt}$.

$\frac{dx}{dt} = ?$

$\frac{d^2x}{dt^2} = ?$

Is $x = e^{-iwt}$ *a 'solution' to* $\frac{d^2x}{dt^2} = -(\omega^2)x$?

Why or why not?