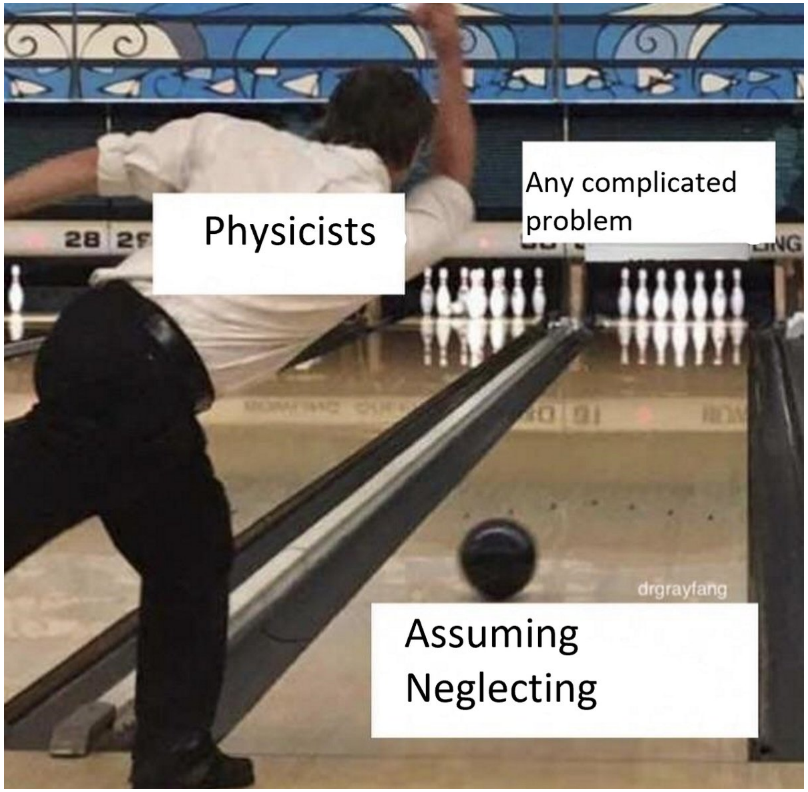
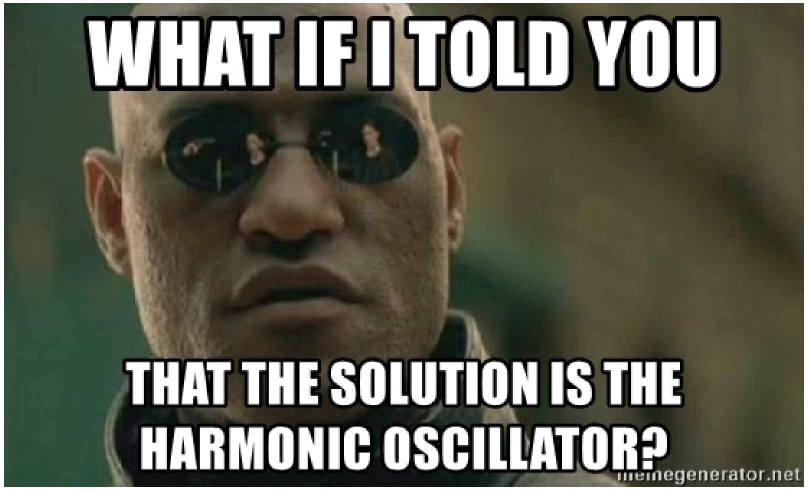
Consider a pendulum with a bob of mass m attached to a rigid but massless rod with length L. Which equation describes the motion of the bob with respect to the vertical?

A. $m\ddot{\theta} = +g \sin\theta$
B. $m\ddot{\theta} = -g \sin\theta$
C. $mL\ddot{\theta} = -mg \sin\theta$
D. $mL\ddot{\theta} = +mg \sin\theta$
E. Something else

Let's take the easy route for the moment.



$$\ddot{\theta} \approx -\frac{g}{L}\theta$$



What is the general solution to:

$$\ddot{\theta} \approx -\omega^2 \theta?$$

A. $\theta(t) = A \cos \omega t$

B. $\theta(t) = B \sin \omega t$

C. $\theta(t) = A \cos \omega t + B \sin \omega t$

D. $\theta(t) = A \cos(\omega t + \delta)$

E. More than one of these

OMGBBQPIZZA

Nature tends to minimize energy

Have you worked with phase space before?

A. Yes, and I recall how that works
B. Yes, I think so…ok, actually, maybe…
C. I have no idea what you are talking about, hoss

Now that we have sketched $\langle \dot{x}, \dot{v} \rangle = \langle v, 0 \rangle$...

Sketch $\langle \dot{x}, \dot{v} \rangle = \langle 0, -x \rangle$ in phase space.

What about $\ddot{x} = -\sin x$?

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