

# Phys 103 HW2 Pass2

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July 16, 2025

## Question 1

**Pf:**

**(a)**

In part (a), I misused the notation, where instead of  $x(0) = A \cos(\phi) = 0$ , I should've written  $0 = x(0) = A \cos(\phi)$  (because we're given  $x(0) = 0$ , not  $A \cos(\phi) = 0$ ).

**(b)**

When doing the calculation, I forgot to assume that  $t_0 \in [0, \frac{2\pi}{w_1})$  is a local maximum of the function, but only assumed  $x'(t_0) = 0$  (which is not sufficient for local maximum).

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## Question 3

**Pf:**

**(a)**

In this section when calculating the power dissipated by the damping force, I should've use that the power dissipated  $P_{\text{dissipated}} = -F_{\text{damp}}v = bv^2$  instead (or else it's phrasing that the power dissipated is negative, or the damping force is providing positive power).

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## Question 4

**Pf:**

**(a)**

## Question 6

Pf:

(a)

I forgot to answer the question whether it's going faster or slower eventually. This depends on the context:

- If the oscillator is undamped, then the amplitude of the system is always the same. Hence, the period of the system stays constant, which it's not slower or faster.
- If the oscillator is damped, then its maximum amplitude is constantly decreasing, so when maximum amplitude is lower, with  $T = \frac{2\pi}{w_0} \left(1 + \frac{\phi_{\max}^2}{16}\right)$ , we get that  $T$  is decreasing. Hence, each cycle actually takes time less than 2 seconds; Since each cycle takes less time, within the same time elapsed there are more cycles happened, hence it records a higher time elapsed than the actual time, showing that the pendulum eventually runs faster.