#38 Damped and Forced Oscillations Pre-class

Due: 11:00am on Wednesday, November 21, 2012

Note: You will receive no credit for late submissions. To learn more, read your instructor's Grading Policy

Exercise 14.59

An unhappy rodent of mass 0.297 kg , moving on the end of a spring with force constant 2.50 N/m , is acted on by a damping force $F_x = -b \cdot v_x$.

Part A

If the constant b has the value 0.893 kg/s , what is the frequency of oscillation of the mouse?

ANSWER:

f = 0.395 Hz

Correct

Part B

For what value of the constant b will the motion be critically damped?

ANSWER:

b = 1.72 kg/s

Correct

Exercise 14.64

A sinusoidally varying driving force is applied to a damped harmonic oscillator of force constant k and mass m. If the damping constant has a value b_1, the amplitude is A_1 when the driving angular frequency equals $\sqrt{k/m}$.

Part A

In terms of A_1, what is the amplitude for the same driving frequency and the same driving force amplitude F_{max}, if the damping constant is $3b_1$?

Express your answer in terms of the given quantities.

ANSWER:

$$A = \frac{1}{3}A_1$$

Correct

Part B

In terms of A_1, what is the amplitude for the same driving frequency and the same driving force amplitude F_{max}, if the damping constant is $b_1/2$?

Express your answer in terms of the given quantities.

ANSWER:

$$A = 2A_1$$

Correct

Score Summary:

Your score on this assignment is 100%.
You received 10 out of a possible total of 10 points.