1. **(1 pt) mathbioLibrary/setABiocLabs/Lab121_A3_cricket.pg**

Because of the accuracy of WebWork, you should use 5 or 6 significant figures on all problems.

a. In lecture we saw data supporting the idea that crickets chirping could be used as a type of thermometer, albeit a crude one. The lecture notes presented the classic folk "cricket thermometer," formalized by Dolbear, which satisfied the linear relationship:

$$T = N/4 + 40,$$

where T and N were the temperature and the number of chirps/minute, respectively. Determine the slope and T-intercept for this line.

Slope = ____ T-intercept = ____

The Bessey brothers later made careful measurements and did a linear least squares best fit to their data and obtained the linear relationship

$$T = 0.21N + 40.4.$$

Determine the slope and T-intercept for this line.

Slope = ____ T-intercept = ____

b. Below are recordings of four crickets chirping at different temperatures. In this question, you time the number of chirps/minute of the four crickets.

Sound for Cricket A
Sound for Cricket B
Sound for Cricket C
Sound for Cricket D

Below are a list of chirping rates for crickets, and you select the answer that is closest to the chirping rate for the sounds that you measured above. (Note you will need to do this for each partner's WeBWorK problem separately.)

___1. Cricket A
___2. Cricket B
___3. Cricket C
___4. Cricket D

A. 263 chirps/min
B. 37 chirps/min
C. 67 chirps/min
D. 201 chirps/min
E. 163 chirps/min
F. 217 chirps/min
G. 133 chirps/min
H. 103 chirps/min

c. In your lab report, create a graph of each of the models (one graph with both models). Show clearly the data points that you gathered in Part b. Write a short paragraph on how you collected the data to find the correct answers.

d. The cricket thermometer model is a linear model. Each of the variables has physical units. For example, T has units $^\circ F$.

What are the units for the coefficient representing the slope?

- A. $^\circ F$
- B. $^\circ F \times \text{min}/\text{chirp}$
- C. chirps/min
- D. $^\circ F \times \text{chirp}/\text{min}$
- E. None of the above

What are the units for the coefficient representing the T-intercept?

- A. chirps/min
- B. $^\circ F/\text{chirp}$
- C. $^\circ F$
- D. $^\circ F/\text{min}$
- E. None of the above

e. Clearly errors are introduced when counting the number of chirps/min. Suppose that the error for counting the chirps/min for Cricket A is ± 5 chirps/min. Find the range of temperatures predicted by the Dolbear model

_____ $\leq T \leq$ _____

Also, find the range of temperatures predicted by the Bessey model

_____ $\leq T \leq$ _____

Suppose that the error for counting the chirps/min for Cricket C is ± 10 chirps/min. Find the range of temperatures predicted by the Dolbear model

_____ $\leq T \leq$ _____

Also, find the range of temperatures predicted by the Bessey model

_____ $\leq T \leq$ _____

f. In your lab report, write a brief paragraph discussing the accuracies of the models from your lab experience, what are the major sources of error (list at least two). How much agreement is there between the different models have in predicting the temperature.