**Final Lecture Exam Questions (used by Overath):**

Answer questions 1-5 based on the following figure. Note that the species *Datura stromonium* is not one of the species that we examined as part of the Big Data/Ecoinformatics activities.

Figure 1. Response of the flowering in the plant *Datura stramonium* (Jimson weed) to temperature changes in Ohio from 1895-2009. DOY = Day of the Year. Information from Callinger et al. 2013. Ecology Letters 16:1037-1044.

1. The figure above is a \_\_\_\_\_\_\_\_ graph because the x-axis has \_\_\_\_\_\_\_ data.

A. bar, categorical

B. line, numerical

C. line, categorical

D. scatterplot, numerical

E. scatterplot, categorical

2. Which of the following is true for timing of flowering in this species?

A. This species flowers 398.22-365 = 33.22 days earlier now than it did in 1895.

B. This species flowers 398.22-365 = 33.22 days later now than it did in 1895.

C. This species flowers 13.52 days earlier now than it did in 1895.

D. This species flowers 13.52 days later now than it did in 1895.

E. This species flowers about the same time now as it did in 1895 because the R2 is not very large.

3. In some parts of its range, *Datura stramonium* is pollinated by hawk moths, who use the nectar the flowers produce as food. If adult hawk moths have changed emergence date 6.55 days per degree Celsius since 1895, would they still be an effective pollinator for this flowering plant if temperature increased 2oC?

A. Yes, because both flower and moth would have shifted their activity about 13 days earlier.

B. Yes, because both flower and moth would have shifted their activity about 13 days later.

C. No, because flowers are now opening later and hawk moths emerging earlier and would have no food and many would die before the flowers open and produce nectar.

D. No, because flowers are now opening earlier and hawk moths emerging later, and many flowers would not be pollinated.

4. As part of the Phenology activity, you also examined change in spring temperatures across Ohio and across years. Why is it inappropriate to use only a subset of the total years to establish a climatic pattern?

A. Actually, it’s NOT inappropriate to use a subset of the data as it gives a clearer picture of what’s happening without all the “noise” of random changes in temperature that occur over a longer period.

B. It’s inappropriate because a smaller segment, such as the last 10-20 years, would not be representative of changes over a longer time period, such as 115 years.

C. It’s inappropriate to use the last 10-20 years because temperature has been changing much faster more recently than in the last 115 years, making it seem that the change is larger than it really is.

**Final Lab Exam Questions (used by Grisé):**

1.  After graphing and discussing flowering dates for 6 species of plants, what is the conclusion we agreed upon when we examined the data for all 6 species?

Plants flowering during the spring are flowering earlier in the spring but some species show a larger shift than do other species.

2.  Why might the trend of warmer spring temperatures be stronger in the northern region of Ohio?

Lake Erie has a very large effect on the air temperatures in the northern region of Ohio.  Lake Erie has warmer water during the winter.  This warmer water will have a very strong effect on the air temperature in the northern regions of Ohio.

3.  Using Excel and the data on the computer in the lab, make a graph of temperature vs. time.

4.  Using Excel and the data on the computer in the lab, make a graph of flowering time vs. temperature.