Please show all work and **box your final answers**. If you need more room, you may use the backs of the pages. Calculators are allowed, but cellphones are not. Good luck!

1. Identify the sampling method used in each of the following studies as either simple random sample, systematic sampling, convenience sampling, or stratified sampling.

(1) (a) The student newspaper randomly selects 20 students from each grade to answer a survey about how many hours they spend studying each week. STRATIFIED

(1) (b) In order to determine what percentage of americans smoke cigarettes, a researcher stands on the corner outside their office and counts the number of people who walk by and the number of those people that are smoking a cigarette. CONVENIENCE

(1) (c) In order to determine the average income in the Unites States, the IRS generates 500 random social security numbers and studies the tax returns for those people. SIMPLE RANDOM SAMPLE

(1) (d) In order to find out more about their customers, the cashiers at a supermarket begin asking every 10th person for their zip code. SYSTEMATIC

2. A pharmaceutical company decides to test the effectiveness of a new blood pressure medication it has recently developed. 100 participants are split into two groups of 50. One group is given a 30 day supply of the new medication and the other group is given a 30 day supply of placebos, which look identical to the new medication in every way. Over the next 30 days, the researchers measure the blood pressure of every participant 3 times each day.

(2) (a) Identify the control group and the treatment group.

PLACEBO   MEDICATION

(2) (b) Does this experiment use any type of blinding? Explain.

SINGLE BLIND - PARTICIPANTS DON'T KNOW WHICH GROUP THEY'RE IN.

(COULD BE DOUBLE BLIND, BUT IT DOESN'T SAY IF RESEARCHERS
KNOW WHICH GROUP EACH PARTICIPANT BELONGS TO)

(2) (c) How might this experiment suffer from bias? *Hint: Consider the source.*

THE PHARMACEUTICAL COMPANY HAS FINANCIAL INCENTIVE TO
PRODUCE RESULTS WHICH SHOW THE MEDICATION IS
EFFECTIVE.

3. Use the multiple time-series diagram below to answer the questions that follow.

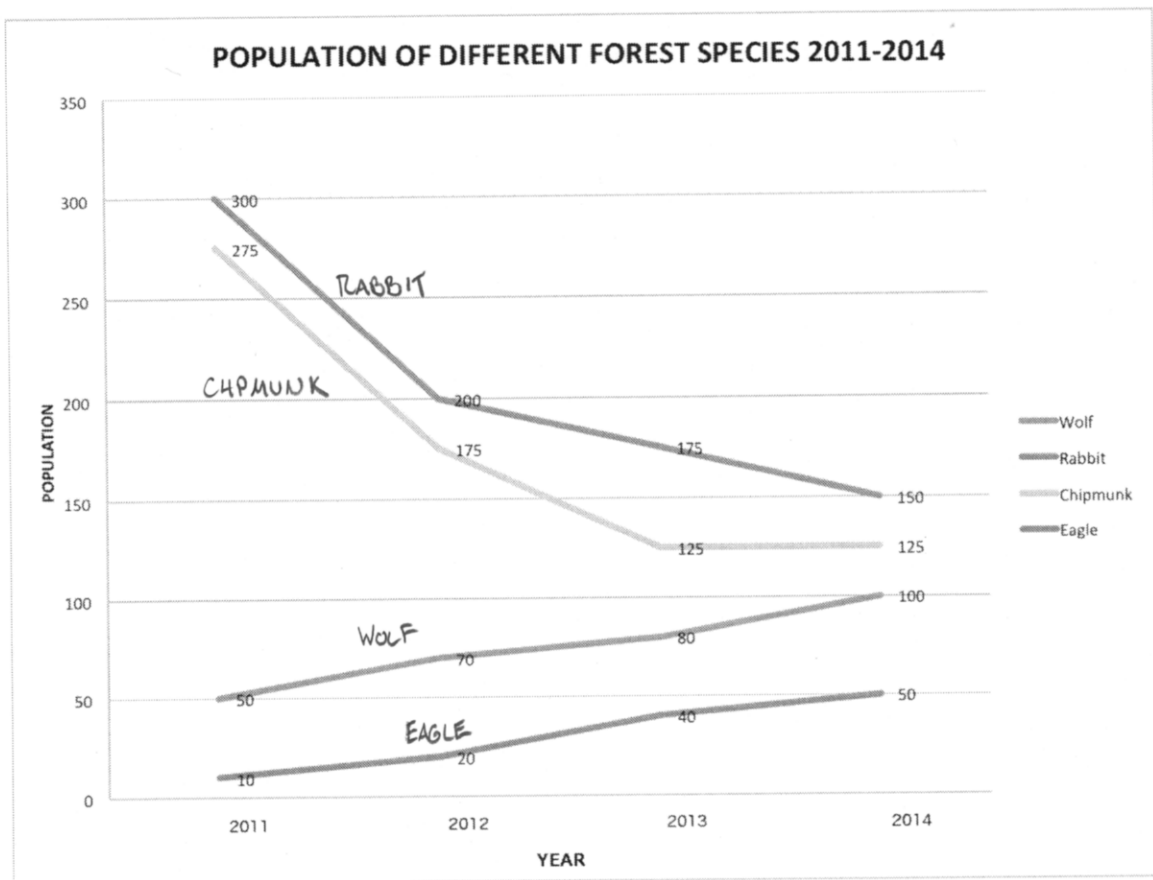**POPULATION OF DIFFERENT FOREST SPECIES 2011-2014**

Figure 1:

(4)   (a) Which species had the largest absolute increase in population from 2011 to 2014?

WOLF :   ABS CHANGE = 100 - 50 = 50

EAGLE :   ABS CHANGE = 50 - 10 = 40

WOLF

(4)   (b) Which species had the largest relative increase in population from 2011 to 2014?

WOLF : REL. CHANGE = $\dfrac{100 - 50}{50}$ × 100% = 100%

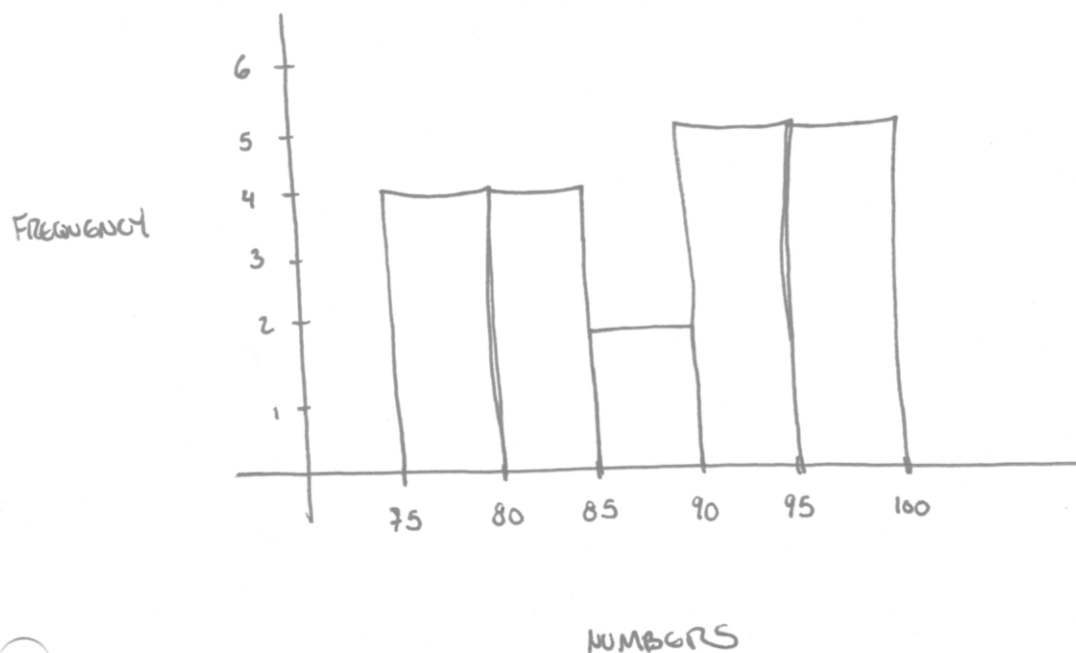EAGLE : REL. CHANGE = $\dfrac{50 - 10}{10}$ × 100% = 400%

EAGLE

4. Here are 20 random integers between 75 and 100.

$$
\begin{array}{ccccc}
94 & 83 & 94 & 82 & 99 \\
99 & 94 & 87 & 81 & 76 \\
93 & 98 & 87 & 77 & 98 \\
96 & 76 & 94 & 82 & 79
\end{array}
$$

(4)   (a) Using a bin size of 5, group the data to make a frequency table which includes columns for frequency, relative frequency, and cumulative frequency.

Bin	Frequency	Relative Frequency	Cumulative Frequency
75-79	4	20%	4
80-84	4	20%	8
85-89	2	10%	10
90-94	5	25%	15
95-99	5	25%	20

(4)   (b) Draw a histogram to illustrate the binned data.

FREQUENCY

NUMBERS

5. Use the following contour map of atmospheric pressure to answer the following questions.

NCEP/NCAR Reanalysis
500mb Geopotential Height (m) Climatology 1968-1996
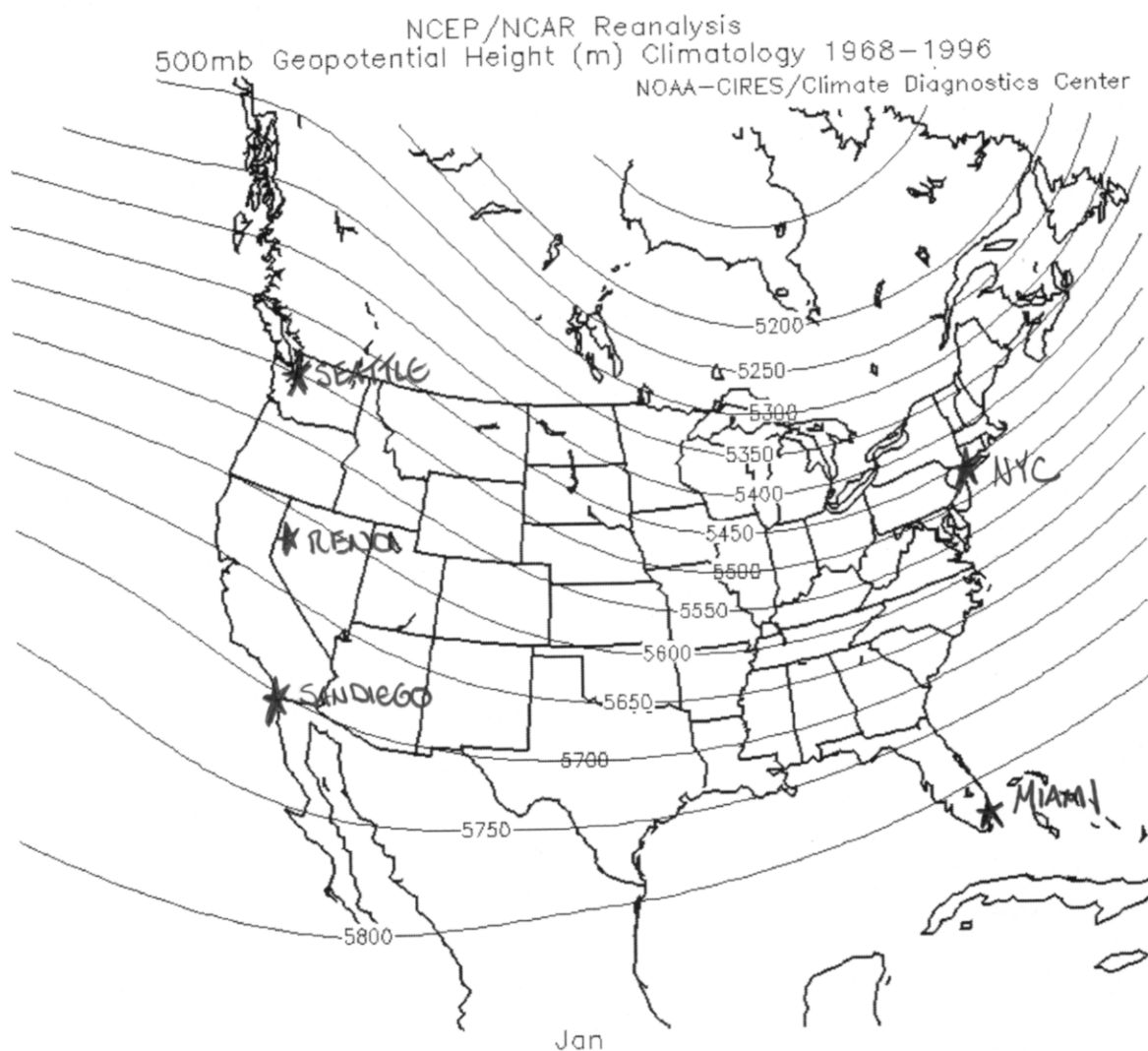NOAA-CIRES/Climate Diagnostics Center

Figure 2:

(2) (a) Does the atmospheric pressure increase more from Seatlle to San Diego or from New York City to Miami? Why?

NYC TO MIAMI - CROSSES MORE CONTOUR LINES

(2) (b) Estimate the atmospheric pressure in Reno, NV.

5625 (ANY NUMBER BETWEEN 5600 & 5650)