**(1) Research Design:** A researcher wants to study the effect of more homework on students' performance. He divides the students in two groups and gives one group more homework than the other. At the end of the semester he compares their grades.
a) Draw a diagram that shows how different treatments are conducted and how different groups are compared in this study.
b) Offer two ideas that can improve this study?

(2) Data Summary: The following data show annual mortality in 20 U.S. cities.
Sketch 1) a stem plot and 2) a box plot of the data.

City	Mortality	City	Mortality
Akron, OH	921.87	Chattanooga, TN-GA	1017.61
Albany-Schenectady-Troy, NY	997.87	Chicago, IL	1024.89
Allentown, Bethlehem,PA-NJ	962.35	Cincinnati, OH-KY-IN	970.47
Atlanta, GA	982.29	Cleveland, OH	985.95
Baltimore, MD	1071.29	Columbus, OH	958.84
Birmingham, AL	1030.38	Dallas, TX	860.1
Boston, MA	934.7	Dayton-Springfield, OH	936.23
Bridgeport-Milford, CT	899.53	Denver, CO	871.77
Buffalo, NY	1001.9	Detroit, MI	959.22
Canton, OH	912.35	Flint, MI	941.18

(3) Scatter Plots (First test 2010): Here is a scatter plot. X-axis is the percentage of students who take the SAT test in each state and y-axis is the average SAT verbal in each state. The regression line best fitting these points is also shown.
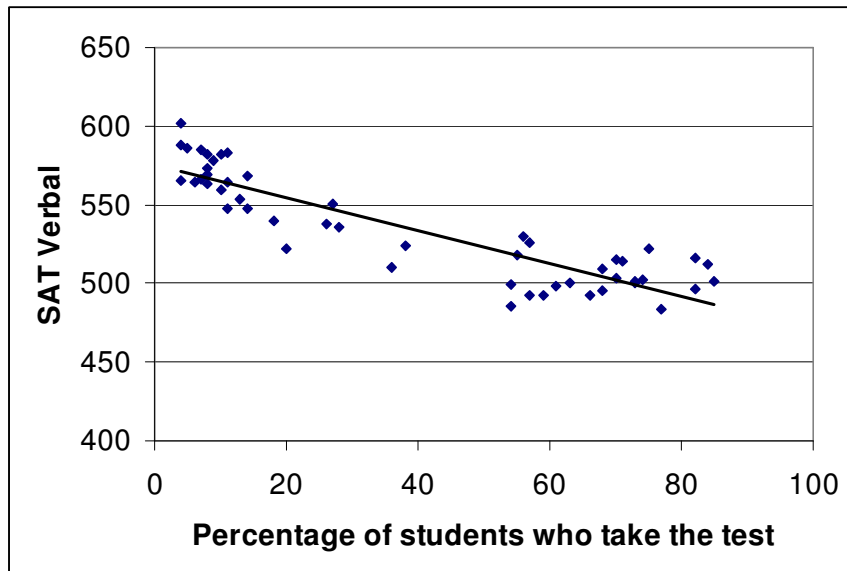
(a) The equation of the line is y = -1.0352x + 574.97. (R^2=0.81)
The slope of this line is _____. What kind of association do you see: _____.
What is the correlation between the variables? _____.

(b) What would the regression line predict for a state where the percentage of students who take the test is 50%:
What about when the percentage is 10%:

(4) Understandings in your own words :

1) what is the variance.
2) what is R^2.
3) what is a negative association

(5) Normal distribution (population): Assume that milk consumption per capita is 0.78 of a glass a day.

a: If 95% of people drink between 0.98 and 0.58 of a glass every day, what is the standard deviation of this distribution?
b: Assume that doctors suggest every body to drink more than 1 glass of milk of every day. What portion of the population drink more than a glass of milk every day?

(6) Normal distribution (Sample mean): Assume that milk consumption per capita is 0.78 of a glass a day, with a standard deviation of 0.1.

a: If I take a sample of 50 people, what is the chance that my results show that milk consumption is more than 0.8 of a glass?
b: If I take a sample of 50 people, what is the chance that my results show that milk consumption is between 0.77 and 0.8 of a glass?

(7) Normal distribution (Sample proportion): From an ad.:

"86% of the UAlbany students are happy! This statement is based on a sample study of 1011 students."

Report the 95% confidence interval for this statement.

(8) Hypothesis testing: We would like to measure happiness in our university. We ask from a sample of 100 people to report their happiness in the scale of 1-10 (10 very happy). The average of results is 5.5. Can we say that the average of happiness in our university is significantly higher than 5? Assume that the standard deviation in population is 2. State and test proper hypotheses.

(9) t-test: The average of monthly income per capita in our sample of study (n=36) is $3,500. The standard deviation in our sample is $1,200.
a- state the 95% confidence interval for this finding.
b- we would like to know if currently monthly income per capita in population is more than $3,200. State and test proper hypotheses.