

For full credit solve all problems using calculator to find any p-values or confidence intervals and show work as we've done in class. Don't forget to check conditions and give reasons why you believe they are met.

#1) A sports statistician wished to investigate how distance from the basket affect shot accuracy in basketball. A large random sample of basketball games were selected for study and for each game, video footage of every shot attempted was analyzed. For each shot the distance it was recorded whether the shot went in the basket (successful shot) or missed along with the distance the player was from the basket (to the nearest foot) when the ball was thrown. Then for each distance from the basket the percentage of shots that were successful was recorded, for example: at a distance of 3 feet 44% of shots were made, and at a distance of 20 feet 8% of shots were made. The statistician performed a linear regression of the data set which produced the following software output:

Predictor	Coef	SE Coef	T	P
Constant	50.3885	27.143	1.8564	0.0317
Distance	-2.4511	1.6130	-1.5196	0.0643

$s = 4.1572$ $r^2 = 0.6403$

(a) Use the computer output above to determine the equation of the sample's least squares regression line. Identify all variables used in the equation.

(b) Interpret the slope of the LSRL for the sample in the context of the problem.

(c) Interpret the value for r^2 in the context of the problem.

#2) In order to be a certified welder, students must take an approved course at a vocational school and pass a welding certification test. A researcher wished to determine if there were differences in how effective welding school programs were in different parts of the U.S., so an SRS of students enrolled in welding programs was selected from each of three regions (West Coast, Middle America, East Coast) and for each student it was recorded whether they passed or failed their welding certification test on the first attempt. The data collected are display in the following table:

	U.S. Region			
	West Coast	Middle America	East Coast	<i>total</i>
Passed	215	327	298	<i>840</i>
Failed	27	41	35	<i>103</i>
<i>total</i>	<i>242</i>	<i>368</i>	<i>333</i>	<i>943</i>

(a) If a welding student is selected at random from this sample, what is the probability that the selected student will be from the East Coast?

(b) If a welding student is selected at random from this sample, what is the probability that the selected student will have passed, given that they are from the West Coast?

#3) A large tire manufacturer wishes to determine whether there are differences in the stopping distances of the tires manufactured at their 10 factories in Canada and their 10 factories in England. They will select a sample of sets of tires from each country and subject the sets of tires to standardized stop-distance testing which records the number of feet it takes a car to stop on dry pavement with the set of tires under test installed.

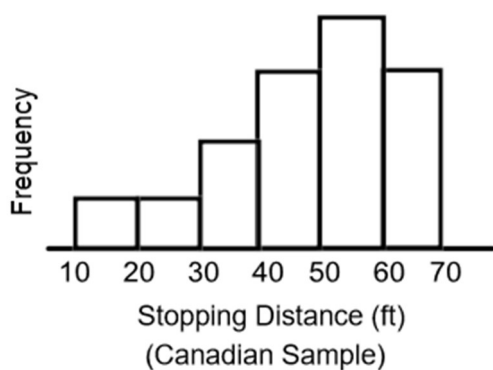
(a) What is the name of this sampling technique being used in each of these following sampling scenarios?

(i) All of the sets of tires produced in all factories across Canada in a given month are numbered with a unique serial number and a random number generator is used to generate 100 random serial numbers. The sets of tires with these serial numbers are included in the Canadian sample for testing. This process is repeated with the factories across England to produce the English sample for testing.

(ii) Three factories are chosen randomly from the factories in Canada, and then all of the tire sets produced in a given month are included in the Canadian sample for testing. Three factories are chosen randomly from the factories in England, and then all of the tire sets produced in a given month are included in the English sample for testing.

(iii) A Simple Random Sample of tire sets from each of the 10 factories in Canada is included in the Canadian sample for testing. A Simple Random Sample of tire sets from each of the 10 factories in England is included in the English sample for testing.

(b) The tire sets selected in the sample from each country were tested for stopping distance. A histogram and summary statistics for the stopping distances from the Canadian sample is shown:



$$\bar{X} = 41.7$$

$$s = 14.2$$

$$\text{Median} = 52.4$$

$$Q1 = 32.6$$

$$Q3 = 60.2$$

$$n = 243$$

Describe this distribution of stopping distances for the Canadian sample tire sets.

(c) Summary statistics for the science test scores from the samples of students in both districts is provided below:

Canadian Sample

$$\bar{X} = 41.7$$

$$s = 14.2$$

$$\text{Median} = 52.4$$

$$Q1 = 32.6$$

$$Q3 = 60.2$$

$$n = 243$$

English Sample

$$\bar{X} = 43.8$$

$$s = 11.9$$

$$\text{Median} = 56.3$$

$$Q1 = 34.4$$

$$Q3 = 63.1$$

$$n = 215$$

Conduct a hypothesis test to determine if there is a statistically significant difference in the mean stopping distance between tire sets manufactured in the factories in Canada vs. England.