STA 200 Lab12 NAME____________________

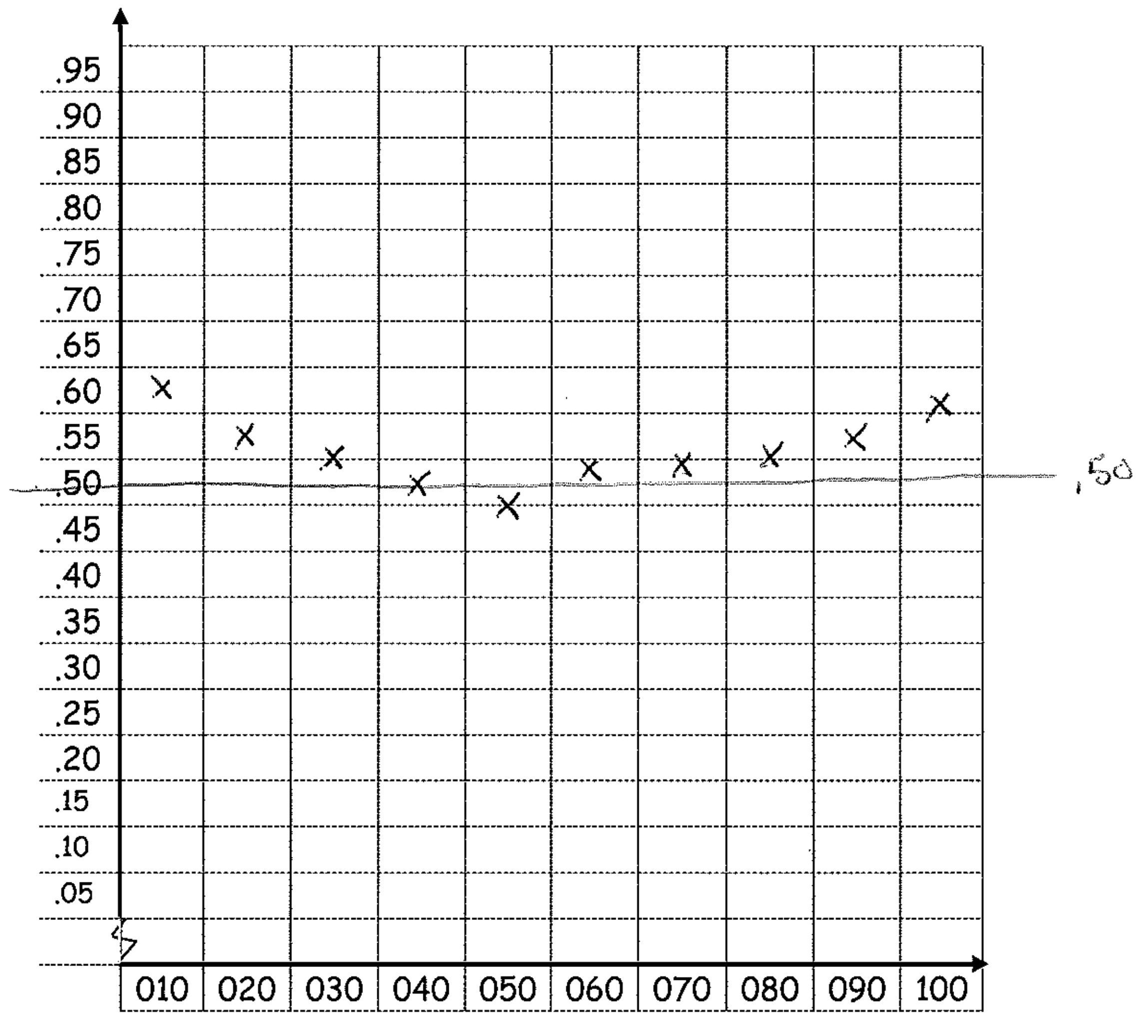
1. a) Toss a coin 100 times. Stop each time you've done 10 tosses (that is, stop after 10 tosses, 20 tosses, 30 tosses, and so on), compute the proportion of heads on those 10 tosses, and then compute the proportion of heads on all of the tosses up to that point. Record your results in the chart below.

Example:

Cumulative No. of Tosses	Outcome	Proportion of Heads in this set of 10 Tosses	Cumulative Proportion of Heads
10	HHHTHHHTTH	$\frac{7}{10}$	$\frac{7}{10}$ = .7
20	TTTTHHHHTT	$\frac{4}{10}$	$\frac{11}{20}$ = .55

Cumulative No. of Tosses	Outcome	Proportion of Heads in this set of 10 Tosses	Cumulative Proportion of Heads
10			.60
20			.55
30			.5333
40			.50
50			.48
60			.5167
70			.5143
80			.5375
90			.5444
100			.58

1. b) Plot the cumulative proportion versus the cumulative number of tosses and draw a line graph. Put the cumulative number of tosses on the horizontal axis. (Be sure to label both axes.)



2. An insurance company collects data on the driving records of its policy holders. For a recent year, the following table shows the number of drivers who had accidents sorted by the number of miles the person drove in that year.

	Number of miles driven in the year		Total
	Less than 10,000 miles	More than 10,000 miles	
Accident	550	2530	3080
No Accident	1570	5350	6920
Total	2120	7880	10000

a) What percent of the people who had accidents had driven less than 10,000 miles in the year?

$$\frac{550}{3080}$$

b) What proportion of those who drove less than 10,000 miles had an accident?

$$\frac{550}{2120}$$

c) If one person is chosen at random from those who had not had an accident, what is the probability that the person had driven more than 10,000 miles?

$$\frac{5350}{6920}$$

d) What is the chance of having an accident?

$$\frac{3080}{10000}$$

	Number of miles driven in the year		Total
	Less than 10,000 miles	More than 10,000 miles	
Accident	550	2530	3080
No Accident	1570	5350	6920
Total	2120	7880	10000

e) Among those who drove less than 10,000 miles, what is the probability of having an accident?

$$\frac{550}{2120}$$

f) Among those who drove more than 10,000 miles, what is the risk of having an accident?

$$\frac{2530}{7880}$$

3. Decide whether each of the following pairs of events are mutually exclusive (i.e. whether they can happen at the same time or not).

a) Selecting a boy from a group of students
Selecting a girl from a group of students
yes can't be boy & girl at same time

b) Drawing a king from a deck of cards
Drawing a diamond from a deck of cards
no can be the king of diamonds

c) Selecting a student who is taking ENG 101
Selecting a student who is taking HIS 108
no can be in both classes

d) Selecting a number that is a multiple of 5
Selecting a number that is a multiple of 7
no for example "35"

e) Selecting a person having a birthday in February
Selecting a person having a birthday on the 30th of a month
yes Feb never has a 30th day

4. The probability that an acre of land in Canada is forest is .35 while the probability that an acre of land in Canada is pasture is .03. Choose one acre of land at random.

a) What is the probability that the acre chosen is not forested?
.35 is prob of "forest" so 1 - .35 = .65 = prob of "not forest"

b) Are the events "forest" and "pasture" mutually exclusive?
yes

c) What is the probability that the acre chosen is either forest or pasture?
.35 + .03 = .38

d) What is the probability that the acre chosen is something other than forest or pasture? 1 - .38 = .62

5. In an opinion poll of 1025 women, those who were married were asked whether their husbands did their fair share of household chores. The results are:

Answer	Probability
Does more than his fair share	.12
Does his fair share	.61
Does less than his fair share	.27 = 1 - .12 - .61

A married woman is chosen at random and asked her opinion.

a) What is the probability that her answer is "Does less than his fair share"?
.27

b) The event "I think my husband does at least his fair share" contains the first two answers. What is its probability?

.73

6. A large sample of first-year college students was asked to report their rank in their high school class. The responses are:

Rank	Top 20%	Second 20%	Third 20%	Fourth 20%	Bottom 20%
Probability	.41	.23	.29	.06	.01

a) What is the sum of these probabilities? Why would you expect this to be the sum? 1 since it has to total up to 100%

b) If a first-year college student is chosen at random, what is the probability that the student was not in the top 20%? $1 - .41 = .59$

c) What is the probability that a student chosen at random was in the bottom 40% of their class? $.01 + .06 = .07$

7. On a Friday night the Smith and Jones families independently decide to eat out. The probability that the Smith family chooses the A1 Café is .15 while the probability that the Jones family chooses the A1 Café is .20. What is the probability that

a) both families choose the A1 Café? $.15 \times .20 = .03$

b) the Smith family chooses to go to another restaurant? $1 - .15 = .85$

c) the Jones family chooses to go to A1 Café but the Smiths go to another restaurant? $.85 \times .2 = .17$

8. In a Pick 3 lottery game you pay $1 and choose a 3-digit number. If your number matches the winning number you win $500. Since there are 1000 three-digit numbers, the probability of matching the winning number is 1/1000.

Outcome	You win $0	You win $500
Probability	.999	.001

a) What is the expected value? $0 \times .999 + 500 \times .001 = .5$

b) Interpret this value in terms of your expected winnings from buying a $1 Pick 3 ticket? For each dollar played, the average return is fifty cents

9. The distribution of grades in a statistics course is:

Grade	A	B	C	D	E
Probability	.2	.3	.3	.1	.1
Quality Point Value	4	3	2	1	0

a) What is the expected value? $.2 \times 4 + .3 \times 3 + .3 \times 2 + .1 \times 1 + .1 \times 0$
$= .8 + .9 + .6 + .1 = 2.4$

b) How can you interpret this value?

the expected or average grade for a random student would be ~~[illegible]~~ between a B & C.