EPPS 2302 : Exam #1

To get full credit for your answer, you must show your work. Use the space provided on this sheet to show your work.

General Knowledge(40pt)

Problem 1(10pt)

Determine whether the quantitative variable is discrete or continuous.

1 the number of bottles of juice sold in a cafeteria during lunch

discrete

2 the speed of a car on a Boston tollway during rush hour traffic

continuous

Problem 2(10pt)

Determine the level of measurement(nominal, ordinal, interval, ratio) of the variable.

1 the medal received (gold, silver, bronze) by an Olympic gymnast

ordinal

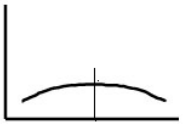
2 the day of the month

interval

Problem 3(10pt)

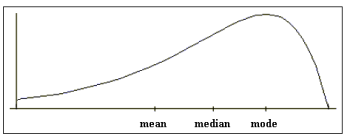
In the space below, draw the distribution and label the approximate positions of the mode, median and mean

1 platykurtic distribution



Platykurtic Curve

2 negatively skewed distribution



Problem 4(10pt)

1 When event A and B are independent, what is P(A|B) and why ?

P(A)
$\because$ P(A|B) = P(A)P(B)/P(B).

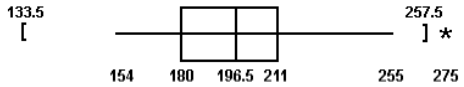
2 As our sample size increases, our standard error **(increases or decreases)** and our margin of error **(increases or decreases)**
decreases, decreases

Computation(60pt)

Problem 5(10pt)

Descriptive statistics

1 The cholesterol levels (in milligrams per deciliter) of 30 adults are listed below. Draw a boxplot that represents the data. Also, identify values for Q1,Q2,Q3 and outliers.
154 156 165 165 170 171 172 180 184 185
189 189 190 192 195 198 198 200 200 200
205 205 211 215 220 220 225 238 255 275



2 Find the sample standard deviation
11, 5, 11, 13, 16, 13, 19, 12, 12, 19

4.1

Problem 6(10pt)

Probability

1 A child uses a home-made metal detector to look for valuable metallic objects on a beach. There is fault in the machine which causes it to signal the presence of only 95% of metallic objects over which it passes and to signal the presence of 6% of non-metallic objects. Of the objects over which the machine passes, 20% are metallic.
Find the probability that a given object is metallic and the machine gives a signal.

S : Signal, M : Metal , NM : Non-Metal
P(S|M)= 0.95, P(S|NM)=0.06, P(M)= 0.2
P(M$\cap$S) = P(S|M)*P(M)= 0.95*0.2 = 0.19

2 After completing an inventory of three warehouses, a golf club shaft manufacturer described its stock of 12,246 shafts with the percentages given in the table. Suppose a shaft is selected at random from the 12,246 currently in stock, and the warehouse number and type of shaft are observed. Given that the shaft is produced in warehouse 2, find the probability it has an extra stiff shaft.

		Type of Shaft		
		Regular	Stiff	Extra Stiff
Warehouse	1	19%	8%	17%
	2	14%	8%	14%
	3	2%	18%	0%

14/36 = 0.389

Problem 7(20pt)

Normal Probability Distribution

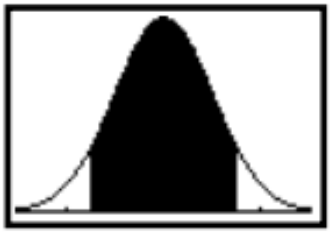
1 Find the sum of the areas under the standard normal curve to the left of z = -1.25 and to the right of z = 1.25.

The area for z=1.25 is 0.8944.
1-0.8944 = 0.1056.
0.1056*2 = 0.2112

2 Determine the area under the standard normal curve that lies between: z = -0.7 and z = 0.7
The area for z=0.7 is 0.7580.
0.7580-0.5 = 0.258
0.258*2 = 0.516

3 Find the z-scores for which 90% of the distribution's area lies between -z and z.

(-1.645, 1.645)



The shaded area is 90%, P(-1.645 < Z < 1.645)
When shaded area is 95%, P(-1.95 < Z < 1.95)
When shaded area is 99%, P(-2.575 < Z < 2.575)
Look at the slide for Feb. 26th.

Problem 7(20pt) continued on next page...

4 A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 460 seconds and a standard deviation of 60 seconds. Between what times do we expect most (approximately 95%. In other words P(-1.96< z < 1.96)) of the boys to run the mile?

$\pm 1.96 = \frac{x-460}{60}$

between 342.4 and 577.6 sec

Problem 8(10pt)

Standard Error

1 A national caterer determined that 37% of the people who sampled their food said that it was delicious. A random sample of 144 people is obtained from a population of 5000. The 144 people are asked to sample the caterer's food. If $\hat{p}$ is the sample proportion saying that the food is delicious, what is the standard deviation of the sampling distribution of $\hat{p}$?

$\sqrt{\frac{0.37(1-0.37)}{144}} = 0.04$

2 The average score of all golfers for a particular course has a mean of 75 and a standard deviation of 4.5. Suppose 81 golfers played the course today. Find the probability that the average score of the 81 golfers exceeded 76.

z=$\frac{76-75}{\frac{4.5}{\sqrt{81}}} = 2$
The area for z=2 is 0.9772
1-0.9772 = 0.0228

Problem 9(10pt)

Confidence Interval

A random sample of 10 parking meters in a resort community showed the following incomes for a day. Assume the incomes are normally distributed. Find the 95% confidence interval for the true mean. Round to the nearest cent.
$3.60, $4.50, $2.80, $6.30, $2.60, $5.20, $6.75, $4.25, $8.00, $3.00

mean = 4.7
s.d. = 1.8
n = 10 $\therefore$ we need to use t-score.
Degree of Freedom is n-1 = 9. Confidence level is 95%.
We can find 2.262 in the t-table.
$4.7 \pm 2.262\frac{1.83}{\sqrt{10}}$

($3.39, $6.01)