Addis Ababa Science and Technology University



College of Natural & Social Sciences

Department of Statistics

Assignment -1 : Probability and Statistics for Engineering

1. A solar energy system was designed and constructed for a North Carolina textile company. The system was used to preheat boiler feed water before injection in the process steam system. The energy delivered to the feed water was observed for a 48-hour period. The values below represent the energy rate (kbtu/hr):

493	500	507	500	501	489	495	508	490	495	511	498
490	507	488	499	509	499	494	490	490	489	515	493
505	497	490	507	497	492	503	495	513	495	492	492
510	501	530	504	501	491	504	507	496	492	496	511

Calculate the following descriptive statistics for the observed energy rates & And interpret the result

a) identify the variable of interest
b) identify sample & population of this experiment
c) indentify whether the variable is: qualitative or quantitative; discrete or continuous
d) identify the level of measurement scale
e) construct the frequency distribution
f) Choose appropriate graph to present this data

g) Average; median

h) Sample standard deviation.

i) Minimum and maximum.

j) Range.

k) Median.

l) Quartiles: first, second, and third.

m) IQR.

n) Which is a better measure of the center of these energy rates, the average or the median? Why? What interval of energy rates includes most typical values, as represented by the energy rates in this sample?

2. Corrosion of reinforcing steel is a serious problem in concrete structures located in environments affected by severe weather conditions. For this reason, researchers have been investigating the use of reinforcing bars made of composite material. One study was carried out to develop guidelines for bonding glass-fiber-reinforced plastic rebars to concrete **("Design Recommendations for Bond of GFRP Rebars to Concrete," *J. of Structural Engr.*, 1996: 247–254).** Consider the following 48 observations on measured bond strength:

11.5 12.1 9.9 9.3 7.8 6.2 6.6 7.0 13.4 17.1 9.3 5.6 5.7 5.4 5.2 5.1 4.9 10.7 15.2 8.5 4.2 4.0 3.9 3.8 3.6 3.4 20.6 25.5 13.8 12.6 13.1 8.9 8.2 10.7 14.2 7.6 5.2 5.5 5.1 5.0 5.2 4.8 4.1 3.8 3.7 3.6 3.6 3.6.

Then repeat questions in above question

3. **Grams per Food Serving** The data shown are the number of grams per serving of 30 selected brands of cakes.

32	47	51	41	46	30
46	38	34	34	52	48
48	38	43	41	21	24
25	29	33	45	51	32
32	27	23	23		
34	35				

Then repeat questions in above question

4. **Job Aptitude Test** A special aptitude test is given to job applicants. The data shown here represent the scores of 30 applicants.

204	210	227	218	254
256	238	242	253	227
251	243	233	251	241
237	247	211	222	231
218	212	217	227	209
260	230	228	242	
200				

Then repeat questions in above question

5. **Trust in Internet Information** A survey was taken on how much trust people place in the information they read on the Internet. Construct a categorical frequency distribution for the data. A trust in everything they read, M trust in most of what they read, H trust I about one-half of what they read, S trust in a small portion of what they read. (Based on information from the *UCLA Internet Report.*)

M	M	M	A	H	M	S	M	H	M
S	M	M	M	M	A	M	M	A	M
M	M	H	M	M	M	H	M	H	M
A	M	M	M	H	M	M	M	M	M

Then identify the variable of interest, identify the level of measurement scale, identify the variable is whether it is qualitative or quantitative variable, construct a frequency distribution, including relative frequencies, Bar chart and Pie-chart for the accompanying data. And interpret the result

6. **Protein Grams in Fast Food:** The amount of protein (in grams) for a variety of fast-food sandwiches is reported here.

23	30	20	27	44	26	35	20	29	29
25	15	18	27	19	22	12	26	34	15
27	35	26	43	35	14	24	12	23	31
40	35	38	57	2	42	24	21		
27	33.								

Them identify the variable of interest, identify the level of measurement scale, identify the type of variable as discrete or continuous, Construct a frequency distribution, draw a histogram, a frequency polygon, and an ogive for the data, using relative frequencies, describe the shape of the histogram and calculate the mean, median, lower quartile, upper quartile and standard deviation. And interpret the result

7. The following categories for type of physical activity involved when an industrial accident occurred appeared in the article **"Finding Occupational Accident Patterns in the Extractive Industry Using a Systematic Data Mining Approach" (*Reliability Engr. and System Safety*, 2012: 108–122):** **A=** Working with handheld tools, **B=** Movement, **C=** Carrying by hand, **D=** Handling of objects, **E=** Operating a machine and **F=** Other as the data observation given below:

A	B	D	A	A	F	C	A	C	B	E	B	A	C
F	D	B	C	D	A	A	C	B	E	B	C	E	A
B	A	A	A	B	C	C	D	F	D	B	B	A	F
C	B	A	C	B	E	E	D	A	B	C	E	A	A
F	C	B	D	D	D	B	D	C	A	F	A	A	B
D	E	A	E	D	B	C	A	F	A	C	D	D	A
A	B	A	F	D	C	A	C	B	F	D	A	E	A
C	D												

Then identify the variable of interest, identify the level of measurement scale, identify the variable is whether it is qualitative or quantitative variable, construct a frequency distribution, including relative frequencies, Bar chart and Pie-chart for the accompanying data from 100 accidents (the percentages agree with those in the cited article). And interpret the result

8. **Items Purchased at a Convenience Store** When 30 randomly selected customers left a convenience store, each was asked the number of items he or she purchased.

2	9	4	3	6
6	2	8	6	5
7	5	3	8	6
6	2	3	2	4
6	9	9	8	9
4	2	1		7
4				

Then identify the variable of interest, identify the level of measurement scale, identify the variable is whether it is qualitative or quantitative variable, construct a frequency distribution, including relative frequencies, Bar chart and Pie-chart for the accompanying data. And interpret the result