Q1

The following data in Table 2.9 are the annual maximum flows in m^3/s in the Colorado River at Black Canyon for the 52 year period from 1878 to 1929. **Prepare Frequency Distribution Table**

Table 2.9: The annual maximum flows in m^3/s in the Colorado River at Black Canyon for the 52 year period from 1878 to 1929:									
1980	1130	3120	2120	1700	2550	8500	3260	3960	2270
1700	1570	2830	2120	2410	2550	1980	2120	2410	2410
1420	1980	2690	3260	1840	2410	1840	3120	3290	3170
1980	4960	2120	2550	4250	1980	4670	1700	2410	4550
2690	2270	5660	5950	3400	3120	2070	1470	2410	3310
3230	3090								
[Adapted from E. J. Gumbel (1954), "Statistical theory of extreme values and some practical applications," National Bureau of Standards, Applied Mathematics Series 33, U.S. Govt. Printing Office, Washington, DC.]									

Q2

For the following data shown in Table 2.10, **Prepare Frequency Distribution.**

Table 2.10: EPA Mileage Rating on 30 Cars Miles Per Gallon									
36.3	30.1	40.5	36.2	42.1	38.5	37.5	40.0	35.6	38.8
38.4	37.1	37.0	41.0	36.3	38.6	35.9	40.2	32.9	44.9
39.8	39.9	38.1	34.8	33.9	36.7	37.0	37.1	39.0	40.5

Q3

From 28-day **concrete cube tests** made in England in 1990, the following results of maximum load at failure in kN and compressive strength in N/mm^2 were obtained: **Prepare two separate Frequency Distribution Table for maximum load and compressive strength.**

Max. load	950	972	981	895	908	995	646	987	940	937	846	947	827	961	935	956
Comp. strength	42.25	43.25	43.5	39.25	40.25	44.25	28.75	44.25	41.75	41.75	38.00	42.5	36.75	42.75	42.0	33.5

Q4

Annual flows of the Derwent at Yorkshire Bridge, England, for the period 1938–1967 are shown in Table 2.11 in (mm) of equivalent runoff over the catchment area above the site**. Prepare Frequency Distribution Table**

Table 2.11: Annual flows in (mm) of equivalent runoff over the catchment area									
946	1074	867	1058	838	837	1133	815	1138	869
910	927	1193	1386	737	1113	1187	955	891	1302
868	969	742	955	665	1143	947	763	1288	1029

Q5

Water quality measurements are taken daily on the River Ouse at Clapham, England. The concentrations of chlorides and phosphates in solution, given below in (mg/L), are determined over a 30-day period. **Prepare two separate Frequency Distribution Table for Chloride and Phosphate.**

Chloride	64	66	64	62	65	64	64	65	65	67	67	74	69	68	68	69

Phosphate	1.31	1.39	1.59	1.68	1.89	1.98	1.97	1.99	1.98	2.15	2.12	1.9	1.92	2.0	1.9	1.74
Chloride	63	68	66	66	65	64	63	66	55	69	65	61	62	62		
Phosphate	1.81	1.86	1.86	1.65	1.58	1.74	1.89	1.94	2.07	1.58	1.93	1.72	1.73	1.73		

Q6

Hurricane damage is of great concern to civil engineers. The frequencies of hurricanes affecting the east coast of the United States each year during a period of 69 years are given as follows by H. C. S. Thom (1966), Some Methods of Climatological Analysis, World Meteorological Organisation, Geneva. **Prepare Frequency Distribution Table**

Table 2.12 Number of Hurricanes versus Frequency										
Number of hurricanes	0	1	2	3	4	5	6	7	8	9
Frequency	1	6	10	16	19	5	7	3	1	1

Q7

Distribution of concrete densities. Let us reconsider the distribution of the concrete densities given in table 2.13. **Prepare Frequency Distribution Table.**

Table 2.13: Results of Concrete Sample Density									
2411	2415	2425	2427	2427	2428	2429	2433	2435	2435
2436	2436	2436	2436	2437	2437	2441	2441	2444	2445
2445	2446	2447	2447	2448	2448	2449	2450	2454	2454
2455	2456	2456	2457	2458	2469	2471	2472	2473	2488

Q8

Annual maximum flow (x) of Tevere (Tiber) River observed at Ripetta, a gauging station in Rome, central Italy, from 1921 to 1974 are shown in Table below. **Prepare Frequency Distribution Table.**

Table 2.14 Annual Maximum Flow (Q) in m^3/sec											
year	Q	year	Q	year	Q	year	Q	year	Q	year	Q
1921	1092	1930	775	1939	985	1948	1600	1957	612	1966	1325
1922	1099	1931	1166	1940	1346	1949	714	1958	822	1967	528
1923	1440	1932	843	1941	1553	1950	794	1959	1370	1968	622
1924	1083	1933	1508	1942	1370	1951	1460	1960	1380	1969	355
1925	1621	1934	1876	1943	743	1952	1240	1961	510	1970	468
1926	1132	1935	1696	1944	1340	1953	1230	1962	810	1971	472
1927	935	1936	1690	1945	896	1954	1270	1963	735	1972	664
1928	1540	1937	**2730**	1946	1600	1955	861	1964	**259**	1973	717
1929	1966	1938	1440	1947	2190	1956	1355	1965	1290	1974	950

Q9

1. The following values of shear strength in (tons/ft^2) were determined by unconfined compression tests of soil**.** Compute Mean, Median, Mode.

0.12	0.21	0.36	0.37	0.39	0.46	0.47	0.50	0.50	0.51
0.53	0.58	0.61	0.62	0.77	0.81	0.93	1.05	1.59	1.73

Q10/ Compute the sample and population standard deviation variance and coefficient of variations.

Q11/ Draw box-plot and indicate outlier.

Q12

The following data for the Ogden Valley artesian aquifer have been collected over a period of years. **Find the sample means, Mode, Median, variances, standard deviations, and coefficient of variation.**

Ogden Valley artesian aquifer Discharge and Recharge data									
Year	1935	1936	1937	1938	1939	1940	1941	1942	1943
Measurement of discharge, acre-ft.	11300	12800	12700	10400	10800	11500	9900	11900	1300
Estimated recharge, acre-ft.	11400	14600	13600	10100	9900	1200	9700	11800	12700
Year	1944	1945	1946	1947	1948	1949	1950	1951	
Measurement of discharge, acre-ft.	13700	14100	15200	15100	15400	16000	16500	16700	
Estimated recharge, acre-ft.	13600	14600	14900	14300	14200	17400	16400	14900	

Q13

Embankment material for a zone of the Santa Rosita Dam in Southern Chihuahua, Mexico, will come from a borrow pit downstream from the dam site at a location that is frequently flooded. A cofferdam 800 m long is needed and the contractor needs to know the optimum construction height. Normal flow (200 m^3/s) requires a height of 3 m. flooding will involve a 3 week delay in construction. Maximum flow rates from years 1921 to 1965 were:

Year	1921	1922	1923	1924	1925	1926	1927	1928	1929
Inflow (m^3/s)	1340	1380	1450	618	523	508	1220	-	1060
Year	1930	1931	1932	1933	1934	1935	1936	1937	1938
Inflow (m^3/s)	412	184	1480	876	113	516	1780	1090	944
Year	1939	1940	1941	1942	1943	1944	1945	1946	1947
Inflow (m^3/s)	397	282	353	597	995	611	985	1430	778
Year	1948	1949	1950	1951	1952	1953	1954	1955	1956
Inflow (m^3/s)	1280	1020	1300	1000	1890	611	409	780	674
Year	1957	1958	1959	1960	1961	1962	1963	1964	1965
Inflow (m^3/s)	969	870	329	458	1556	1217	819	576	1324

Find the sample means, Mode, Median, variances, standard deviations, and coefficient of variation.

Q14

A data set has a mean of 10 and a standard deviation of 2. Find a value that is:

3 standard deviations above the mean.

Q15/ 2 standard deviations below the mean.

Q16

The following series is the minimum monthly flow (m^3/s) in each of the 20 years 1957 to 1976 on a river: 21, 36, 4, 16, 21, 21, 23, 11, 46, 10, 25, 12, 9, 16, 10, 6, 11, 12, 17, and 3

- Find Q_1, Q_2, and Q_3 for the following data set.

Q17/ Determine the z-score for each raw score. Discuss the value? is there any UN-USUAL Data

Q18/ What percentage of the monthly flow (m^3/s) are less than 21 and 36?

Q19/ Find the flowrate value corresponding to the 25^{th} and 60^{th}. 91^{th} percentile.

Q20/ Make a box-and-whisker plot of the data then indicate the interquartile range.

Q21

Given a data set with a mean of 10 and a standard deviation of 2, determine the z-score for each of the following raw scores. [8, 10, 16].

Q22

Compute the quartiles from the following data.

Marks	1-10	11-20	21-30	31-40	41-50	51-60
No. of students	3	16	26	31	16	8

Q23

The data on the table below depict the maximum monthly discharges of a certain River for nine consecutive months. Create a box-and-whisker plot to display the data.

April	May	June	July	August	September	October	November	December
110	98	91	102	89	95	108	118	152

Q24

The water-treatment plant at an air station was constructed for a design capacity of 4,500,000 gal/day (domestic use). It is nearly always necessary to suspend lawn irrigation when demand exceeds supply. There are, of course, attendant losses. Measured demands during July and August 1965 (week days only) were (in thousands of gallons per day, ordered data):

2298	3205	3325	3609	3918	3992	4057	4188	4289	4363
4377	4448	4450	4524	4536	4565	4591	4657	4666	4670
4724	4737	4763	4784	4816	4817	4852	4887	4905	4908
4923	4941	4993	4998	5035	5041	5058	5142	5152	5152
5330	5535								

Compute sample mean, Mode, Median, Standard Deviation and variance.

Q25/ Construct a cumulative histogram in which 4,500,000 gal/day is one of the interval boundaries.

Q26/ On a relative frequency basis, how often did demand exceed capacity?

Q27/ Find Q_1, Q_2, and Q_3 for the following data set.

Q28/ Determine the z-score for each raw score. Discuss the value? is there any UN-USUAL Data

Q29/ What percentage of the measured demands are less than 3992 and 4887 gallons/day?

Q30/ Find the water demand for the water treatment plant values corresponding to the 25^{th}, 51^{th} and 70^{th}. 91^{th} percentile.

Q31/ Make box-and-whisker plot then find the interquartile range.

Q32

A sample of 6 children was selected, data about their age in years and weight in kilograms was recorded as shown in the following table. It is required to find the correlation between age and weight.

No.	1	2	3	4	5	6
Age (years)	7	6	8	5	6	9
Weight (kg)	12	8	12	10	11	13

Q33

A laboratory test for determining the discharge coefficient over a rectangular side weir in sub-critical flow condition was done. The discharge coefficients was found out at different Froude numbers at the upstream end of the side weir as shown in below table.

Fr_1	0.11	0.15	0.19	0.23	0.26	0.31	0.41	0.50	0.57
C_d	0.80	0.78	0.83	0.84	0.82	0.76	0.74	0.67	0.6

Assume the linear relation between Froude number and discharge coefficient then find the regression coefficients.

Q34/ Find the correlation coefficient for this relation based on method of estimating errors.

Q35

The following table are the number of minutes it took 10 mechanics to assemble a piece of machinery in the morning (x), and in the late afternoon (y).

y	10.9	14.2	13.8	21.5	13.2	21.2	16.4	19.3	17.4	19
x	11.1	10.3	12	15.1	13.7	18.5	17.3	14.2	14.8	15.3

Required:

Calculate correlation coefficient.

Q36/ Should the correlation be positive or negative?

Q37

Suppose an appliance store conducts a 5-month experiment to determine the effect of advertising on sales revenue and obtains the following results

Month	Advertising Expenditure (in $1,000)	Sales Revenue (in $10,000)
1	1	1
2	2	1
3	3	2
4	4	2
5	5	4

Find the sample regression line and predict the sales revenue if the appliance store spends 4.5 thousand dollars for advertising in a month.

Q38

The following table below shows a traffic-flow index and the related site costs in respect of eight service stations.

Site No.	Traffic-flow index	Site cost (in 1000)
1	100	100
2	110	115
3	119	120
4	123	140
5	123	135
6	127	175
7	130	210
8	132	200

Calculate the coefficient of correlation for this data.

Q39/ Calculate the Regression of data and find traffic-flow index of 145.

Q40

Interest rates (x) provide an excellent leading indicator for predicting housing starts (y). As interest rates decline, housing starts increase, and vice versa. Suppose the data given in the accompanying table represent the prevailing interest rates on first mortgages and the recorded building permits in a certain region over a 12-year span.

year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Interest rates %	6.5	6.0	6.5	7.5	8.5	9.5	10.0	9.0	7.5	9.0	11.5	15.0
building permits	2165	2984	2780	1940	1750	1535	962	1310	2050	1695	856	510

Find the **least squares line** to allow for the estimation of building permits from interest rates.

Calculate the correlation coefficient for these data.

Q41/ By what percentage is the sum of squares of deviations of building permits reduced by using interest rates as a predictor rather than using the average annual building permits $\bar{y}$ as a predictor of y for these data?

Q42

Construct a tree diagram to find the probabilities of a die thrown 3 times. What is the probability distribution of the random variable X?

Q43

In clinical trials a certain drug has a 8% success rate of curing a known disease. If 15 people are known to have the disease. Whats the probability that at least two cured.

Q44

The manufacture of a bag of sweets claim that there is 90% chance that the bag contains some toffees. If 20 bags are closed. Apply binomial distribution to find the probability that: All bags contains toffees.

Q45/ More than 18 bags contains toffees.

Q46

Use cumulative distribution table for X~B(5,0.2) at $p(X \leq x)$. find the following probabilities.

$P(x \leq 4)$

Q47/ P(x=2)
Q48/ P(x<3)
Q49/ P(x>1)
Q50/ P(x≥3)

Q51

A normal 6 sided fair die is thrown 24 times and the number of (1/6) scored is recorded. Find the mean and variance?

Q52

if x be the rondom variable such that x~ B (n,p) , E(x)=12 and Var (x) = 3. Find n and p variables?

Q53

Find the probability of determining three **soil moisture contents** of a clay sample that are within the specific limit among five different samples in water content test. Assume that 90% of the moisture contents are within the given limit.

Q54

During the **compression test** 20% of the concrete blocks was subjected to shrinkage due do overloaded. What is the probability that, in five randomly selected concrete blocks, in the followings (a, b, c, d) the shrinkage can be seen:

Exactly in **three** blocks the shrinkage can be happen?

Q55/ In **at most one** blocks the shrinkage can be happen?

Q56/ In **at least one** blocks the shrinkage can be happen?

Q57/ Find mean ,Variance and Standard deviation.

Q58

One engineering firm enjoys **40%** success rate in getting state government construction contracts. This month they have submitted bids on **eight** construction projects to be funded by the state government. The bids for different projects are assessed independently of each other.

Find the probability that the firm will get none of those contracts?

Q59/ Find the probability that the firm will get five out of eight contracts?

Q60/ Find the probability that the firm will get all eight contracts?

Q61

The probability that a patient recovers from a rare blood disease is 0.4. If 15 people are known to have contracted this disease, what is the probability that

At least 10 survive,

Q62/ From 3 to 8 survive, and

Q63/ Exactly 5 survive?

Q64/ Find mean ,Variance and Standard deviation.

Q65

In one of the plants experiments, it was found that the probability of obtaining a long plant=3/4 and a short plant =1/4. If a sample of plants consists 4 plans was tested, what is the probability to be?

All are long?

Q66/ Only one is short.

Q67

A biased coin is tossed 6 times. The probability of heads on any toss is 0.3. Let X denote the number of heads that come up. Calculate:

P (X = 2)

Q68/ P (X = 3)

Q69/ P (1 < X ≤ 5)

Q70

The following data in Table 2.9 are the annual maximum flows in m^3/s in the Colorado River at Black Canyon for the 52 year period from 1878 to 1929. **Prepare Frequency Distribution Table**

Table 2.9: The annual maximum flows in m^3/s in the Colorado River at Black Canyon for the 52 year period from 1878 to 1929:

1980	1130	3120	2120	1700	2550	8500	3260	3960	2270
1700	1570	2830	2120	2410	2550	1980	2120	2410	2410
1420	1980	2690	3260	1840	2410	1840	3120	3290	3170
1980	4960	2120	2550	4250	1980	4670	1700	2410	4550
2690	2270	5660	5950	3400	3120	2070	1470	2410	3310
3230	3090								

[Adapted from E. J. Gumbel (1954), "Statistical theory of extreme values and some practical applications," National Bureau of Standards, Applied Mathematics Series 33, U.S. Govt. Printing Office, Washington, DC.]

Q71

FROM ABOVE PROBLEM: Whenever Relevant, present the data in form of:

Q72 / Bar Charts/ multiple/ component bar charts

Q73 / Histograms and relative frequency Histogram

Q75/ Frequency Polygon and Relative Frequency Polygon

Q76/ Ogive (Whenever Relevant)

Q77/ Stem-and-leaf plot

Q78/ Dot Plot

Q79/ Pie Charts

Q80/

80% of people attend their primary care physician regularly; 35% of those people have no health problems crop up during the following year. Out of the 20% of people who don't see their doctor regularly, only 5% have no health issues during the following year. What is the probability a random person will have no health problems in the following year?