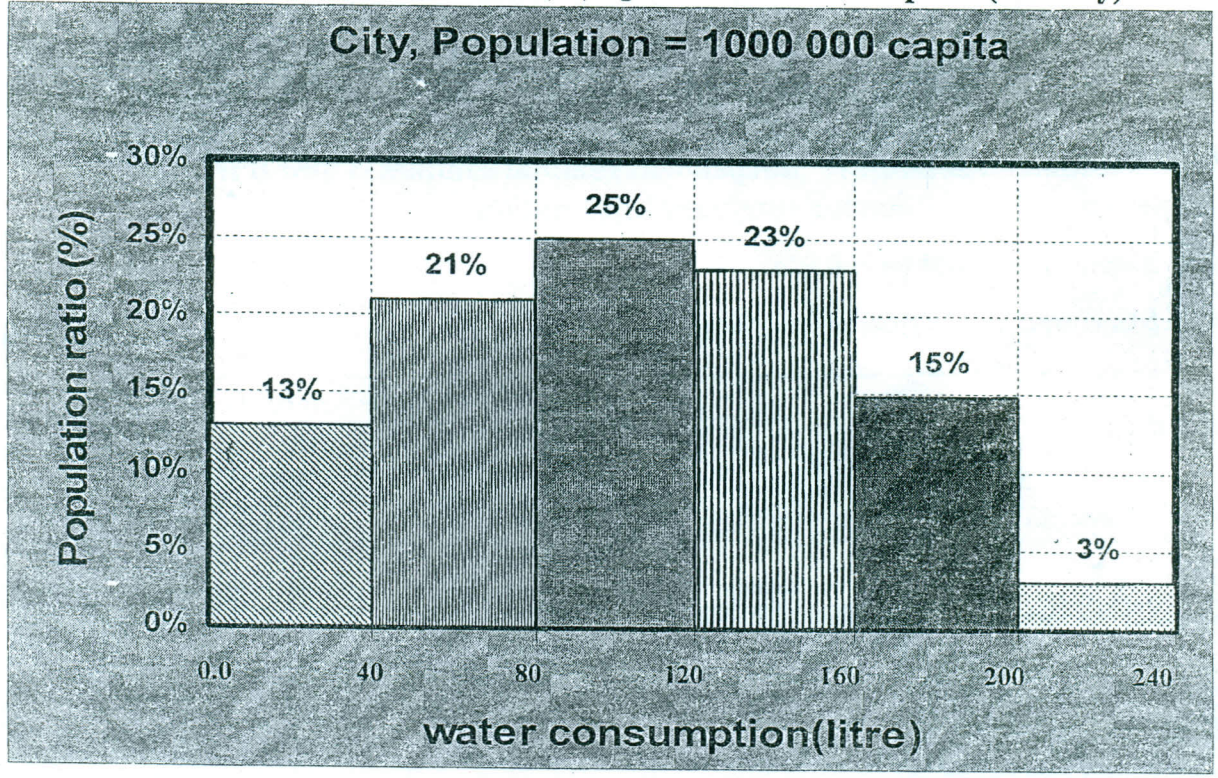




يسمح باستخدام الجداول الإحصائية فقط

Problem 1, Assume a city has a population of one million capita having Population ratio (%) against water consumption (liter/day) in summer season as shown in the following curve. If the water consumption in winter season = 90% of the summer values, as well as the water consumption in autumn and spring seasons = summer values – 20 litre

(Histogram: Population ratio (%) against water consumption (liter/day)



For the average consumption over the whole year find the following

- Calculated the harmonic and geometric mean, mode, median, σ_{n-1} , S_k , and CV.
- Deduce a quadratic equation between the population ratio and the water consumption (in the form $(Y) = AX^2 + BX$ in which X is the water consumption),
Assume that city can follow the normal distribution curve, find the following
- Find the probability that Q is between 190 – 220 liter / capita
- Estimate the number of population, which having consumption more than 220 liter / capita, If the total population is one million.
- Estimate the design discharge, which accepted by 90% of the population.
- If the total area of the above histogram is divided by constant K find the value K so that the diagram represents a probability curve, and find its expectation and variance

(30 points)

Problem 2 : - An express way was established in 1960. As soon as the road is opened it received a traffic 20% of its design capacity. From 1960 to 1970 arithmetic increase rate of the traffic was observed with 4% (design capacity) car/ year. However, a geometric increase rate of the discharge was observed from 1970 to 1980 with 2.0 % / year. Then, the traffic was increased with annual growth rate of .02 from 1980 to 1990. Finally, a decreasing increase rate of the traffic was observed from 1990 up to date with 2.5% / year. If the traffic on 1985 was registered as 50000 car/day. Find the following.

- The design capacity of the road.
- The traffic volume on years 1970, 1980, and 2000 (draw the answer using a bar diagram).
- The traffic volume on years 1965, 1975, and 1995.
- The expected traffic volume on years 2030, and 2060. (20 points)

Problem 3 : A customer selected two independent random samples A and B from different cement companies with the following summary information.

- Is the means are equal ($\alpha = 0.95$)?
- Is the Standard Deviation are equal ($\alpha = 0.90$)? (10 points)

	Model A	Model B
Sample Size	8	9
Sample Mean	90	84
Sample Standard Deviation	3	5

Problem 4 : Of all the cars registered in highway, 20% are heavy trucks. In a sample of 12 cars registered in that road, what is the probability that (using three probability distribution for solving as well as use calculations and tables).

- No vehicles are heavy trucks?
- Exact 9 vehicles are heavy trucks?
- At least 9 vehicles are heavy trucks?
- At most 9 vehicles are heavy trucks?
- Find the number of heavy trucks shall be register with probability of 80% (20 points)

Problem 5: A building is composite from independent materials steel, concrete, and mixed parts. Assume the mean Lifetime of steel, concrete, and mixed parts are 80, 60, 50 years respectively, with standard deviation of 10, 8, 5 years respectively. Find the probability that,

- All connections shall be damaged before 60 years.
- Two types of connections shall be not damaged before 60 years.
- At least one connection shall be damaged before 60 years.
- No thing happen before 70 years (20 points)
- All connection types shall be damaged exactly between 50-70 years

Best regards
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