

Part I Descriptive Statistics

Problem 1	20 Points
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Data arising from a study into fuel consumption in miles per gallon of a sample of 85 cars are recorded in the following frequency table:

Consumption [mpg]	Frequency
[10, 20[2
[20, 30[25
[30, 35[24
[35, 40[25
[40, 50[9

1. Find the mean fuel consumption in miles per gallon
2. Estimate and interpret the standard deviation.
3. How representative is your mean?

Problem 2	20 Points
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The following data give the percentage of women working in five companies in the retail and trade industry. The percentage of management jobs held by women in each company is also shown:

% Working	67	45	73	54	61
% Management	49	21	65	47	33

1. Develop a scatter diagram for these data with percentage of women working in the company as the independent variable.
2. What does the scatter diagram indicate about the relationship between the two variables?
3. Try to approximate the relationship between the percentage of women working in the company and the percentage of management jobs held by women in that company by drawing a straight line through the data.
4. Develop the estimated linear regression equation.
5. Calculate and interpret the coefficient of determination.
6. Predict the percentage of management jobs held by women in a company that has 60% women employees.

Part II

Probability Theory

Important hint: Choose exactly 2 of the Problems 4 – 7. Combinations are not allowed!

Problem 3	20 points
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The average weekly pay for US production worker was \$441.84. Assume that available data indicate that production worker wages were normally distributed with a standard deviation of \$90.

1. What is the probability that a worker earned between \$400 and \$500?
2. For a randomly selected production worker, what is the probability the worker earned less than \$250 per week?
3. How much did a production worker have to earn to be in the top 20% of wage earners?

Problem 4	20 points
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The following data is for U.S. family size:

Size	2	3	4	5	6	7 or more
Probability	?	0.23	0.21	0.10	0.03	0.01

Find

1. the distribution function
2. the expected value
3. the standard deviation
4. the probability that a family has 5 or more members.

Problem 5	20 points
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The lifetime of a certain type of television monitor (in years) is a random variable having the following density function:

$$f(x) = \begin{cases} 0.06x - 0.006x^2 & 0 \leq x \leq 10 \\ 0 & \text{otherwise} \end{cases}$$

1. Set up the corresponding distribution function $F(x)$.
2. What is the probability that the monitor will fall out before a guarantee time of two years?
3. Find the expected life time of the monitor.

Problem 6**20 points**

A life insurance company sells on the average 3 life insurance policies per week. Calculate the probability that in a given week the company will sell

1. any policies at all.
2. three or more policies but less than six.
3. no policies.

Problem 7**20 points**

The following table shows the payoff of a firm in the face of five possible market situations in the coming year

	$b_1(0.35)$	$b_2(0.20)$	$b_3(0.10)$	$b_4(0.15)$	$b_5(0.20)$
a_1	15	5	8	10	1
a_2	5	15	13	8	12
a_3	10	11	9	14	5

1. Using the following utility function, find the “optimal” alternative according to Bernoulli principle.

$$u(v) := \begin{cases} v^2 - 0.8v & \text{when } 0 \leq v \leq 10 \\ 7v + 20 & \text{when } 10 < v \leq 19 \\ 35.40v^{\frac{1}{2}} & \text{when } 19 < v \end{cases}$$

2. Interpret the risk attitude of the firm.