(b) The number of miles travelled in a week by a random sample of 10 sales representatives of a large pharmaceutical company is as follows:

300	290	150	400	310	500	210	550	180	200

Calculate the value of the mean, median, standard deviation and range of the data.

(c) A survey of subscribers to Fortune magazine showed that 54% rented car in the past 12 months for business reasons. 51% rented a car for personal reasons, and 72% rented a car for either business or personal reasons.

(i) What is the probability a subscriber rented a car in the past 12 months for business reasons and for personal reasons?

(ii) What is the probability that a subscriber did not rent a car in the past 12 months?

(7 marks)

Calculate the following integrals

$$\int \left(8x^3 - 3x^2 + 6x\right) dx\,, \qquad \int_0^3 \left(3x^2 - 8x + 5\right) dx\,, \qquad \int (x+5)^3\, dx$$

Differentiate the following functions with respect to the appropriate variable

$f(t) = t^3 - 4t^2 + 5$, $g(P) = \frac{4}{P} - 5$, $h(x) = 3e^{2x^3 - x^2 + 1}$

Calculate the following quantities if possible AB, BA, AC, C^T,

$$A = \begin{pmatrix} 2 & 2 \\ 3 & 6 \end{pmatrix} \quad B = \begin{pmatrix} -1 & 3 \\ 2 & -2 \end{pmatrix} \quad C = \begin{pmatrix} 2 & -2 \\ 1 & 4 \\ 1 & 1 \end{pmatrix},$$

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(c) Assume that the time between arrivals of customers at a particular bank is exponentially distributed with a mean of 4 minutes.

(i) Find the probability that the time between arrivals is greater than 5 minutes.

(ii) Find the probability that the time between arrivals is between 1 and 4 minutes.

- Exponential probability distribution:

$$P(X \le k) = \begin{cases} 1 - e^{-k/\mu}, & k \ge 0, \\ 0, & k < 0. \end{cases} \qquad \left(\text{where } \mu = \frac{1}{\lambda}\right)$$

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(a) What is the future value of € 5,000 invested for 5 years

(i) at 12% interest compounded annually?

(ii) at 12% compounded continuously?

(iii) at 12% compounded quarterly?

6 (a) A bank knows that on average 15% of loans to SME companies will default. For a loan book of 12 SME loans, find the probability that

(i) exactly two will default; 4

(ii) at most one will default; 4

(iii) at least two will default. 4

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Binomial probability density function: $f(x) = \binom{n}{x} p^x (1-p)^{n-x}$, where $\binom{n}{x} = \dfrac{n!}{x!(n-x)!}$.

Mean $\mu_x = np$ and variance $\sigma_x^2 = np(1-p)$.

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(b) The weights of salads taken by customers at a self-serve salad bar are found to be uniformly distributed between 250g and 450g.

(i) Write down the probability density function for this distribution.

(ii) Find the probability that a customer will take a salad weighing more than 400g.

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Uniform probability density function: $f(x) = \begin{cases} \frac{1}{\beta-\alpha} & \text{for } \alpha \leq x \leq \beta, \\ 0 & \text{elsewhere.} \end{cases}$

$P(X \leq k) = \dfrac{k-\alpha}{\beta-\alpha}$, for $\alpha \leq k \leq \beta$. Mean $\mu_x = \frac{1}{2}(\alpha+\beta)$ and variance $\sigma_x^2 = \dfrac{(\beta-\alpha)^2}{12}$.

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5 (a) Suppose A and B are events from a sample space such that
$P(A) = 0.65$, $P(B) = 0.45$ and $P(A \cap B) = 0.32$.

(i) Find $P(B^c)$.

(ii) Find $P(B \backslash A)$.

(iii) Find $P(A \cup B)$.

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(b) An analysis was done on the effect of rain on the performance of a football team over 60 matches. It was raining on 24 of the days. They lost 35 of the matches. It was both raining and they lost on 14 of the days. Are the events of it being raining and losing a match independent? Explain.

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(c) A sports shoe manufacturer makes shoes at two locations: 78% are made in Yangon and 22% in Mandalay. There is a 3.5% probability that a pair of shoes made in Yangon will be returned to the vendor within a month and there is a 4.5% probability that a pair of shoes made in Mandalay will be returned to the vendor within a month.

(i) Find the probability that a pair of shoes chosen at random will be returned to the vendor within a month.

(ii) Given that a pair of shoes is returned to the vendor within a month, find the probability that it was made in Mandalay.

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