

Kafrelsheikh university
 Faculty of engineering
 Physics & engineering mathematics dept.
 Year: 3rd year electrical eng.

Time: 3 h
 Total mark: 70 marks
 Subject: engineering mathematics (3)
 Final 1st term exam (13/1/2016)

$P(A \cap B) = P(A) \cdot P(B) = P(A)$
 $A \cap B =$

$(A^c \cap B^c) = 1 - A \cup B$
 $A^c \cap B^c = P(A \cup B)^c = P(B) - P(A \cap B)$

Answer the following questions: 2015 رياضيات

[1] a- If A, B are two independent events, show that:
 $P(A^c \cap B^c) = P(A^c)P(B^c)$.

b- Let A, B be events with $p(A) = \frac{3}{8}$, $p(B) = \frac{1}{2}$ and $p(A \cap B) = \frac{1}{4}$,
 find $p(A \cup B)$, $p(A^c)$, $p(A^c \cup B^c)$.

c- Find the expectation μ , variance σ^2 and standard deviation σ of the following distribution

x_i	-1	0	1	2	3
$f(x_i)$	0.3	0.1	0.1	0.3	0.2

[2] a- Define probability function (p)?

b- For each $A, B \subseteq S$, prove that:

- 1- $p(A) = 1 - p(A^c)$.
- 2- $p(A \cap B) = p(A) + p(B) - p(A \cup B)$.
- 3- $p(A - B) = p(A) - p(A \cap B)$.

c- Let $S = \{a, b, c, d, e, f\}$ and $p(a) = \frac{1}{16}$, $p(b) = \frac{1}{16}$, $p(c) = \frac{1}{8}$,
 $p(d) = \frac{3}{16}$, $p(e) = \frac{1}{4}$, $p(f) = \frac{5}{16}$. And let $A = \{a, c, e\}$, $B = \{c, d, e, f\}$, $C = \{b, c, f\}$. Find $p(A|B)$, $p(A^c|C)$ and $p(C|A^c)$?

[3] a- If X is a random variable has probability density function

$$f(x) = \begin{cases} c(1-x^2) & , -1 < x < 1 \\ 0 & , \text{otherwise} \end{cases}$$

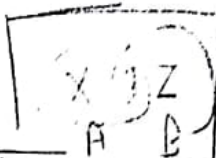
- i) Find the constant c.
- ii) The value of $p(0 < X < 0.75)$.

b- A pair of fair dice is thrown. Let X be the random variable which denotes the minimum of the two numbers which appear. Find the distribution, mean, variance and standard deviation of X,

With my best wishes

Prof. Dr. Arafat Nasef

$S \cap (A - B) = S \cap A - S \cap B$
 $A - B$



A - B

$P(A) = \frac{7}{16}$
 $P(B) = \frac{11}{16}$
 $P(C) = \frac{5}{16}$

$\frac{91}{36}$