Kafrelsheakh 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)

Answer the following questions:

[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

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

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. Arafa Nasef*