KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS
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STAT 301: Introduction to Probability Theory
Semester 152
Final Exam (objective)
Wednesday May 18, 2016
7:00 − 8:00 pm

Name: ID #:

1. (3 points) If $P(A) = 0.7$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$, then

$P(A^c \cup B^c) =$________________________

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2. (1 point) If A is event belonging to a sample space S, the $P(A \mid A) =$________________.

3. (2 points) There is 80% chance that a STAT-301 question will be solved by an actuarial student. 60% chances are there that the same question will be solved by the mathematics student. The probability that mathematics or actuarial student will solve the question is:

(a) 0.48

(b) 0.92

(c) 0.10

(d) 0.75

(e) 1

(f) 0

4. (3 points) There are four coins in a bag. One of the coins has head on both sided. A coin is drawn at random and tossed five times and fell always with head upwards. The probability that it was the coin with two heads is:

(a) 3/128

(b) 1/4

(c) 32/35

(d) 0

(e) 1

(f) none of above

5. (2 points) If a discrete random variable has the probability mass function as,

x:	+3	+2	+1	0	-1	-2	-3
$p(X = x)$:	0.1	0.2	$3k$	k	$2k$	0	0.1

then the value of k is equal to __________ and $E(X)$ =________________.

6. (3 points) If U has a continuous uniform distribution with $f(u) = \frac{1}{4}$, $-2 \le u \le 2$. Then the probability density function $g(v)$ of a variable $V = \sin U$ is ________________.

($\frac{d}{dx}\sin x = \cos x$, $\frac{d}{dx}\cos x = -\sin x$, $\frac{d}{dx}\sin^{-1} x = \frac{1}{\sqrt{1-x^2}}$, $\frac{d}{dx}\cos^{-1} x = \frac{-1}{\sqrt{1-x^2}}$)

7. (2 points) Let $X_1, X_2, \ldots \ldots, X_{36}$ denotes a random sample from Gamma$(\alpha = 2, \beta = 0.5)$. The approximate distribution of $Y = \sum_{i=1}^{36} X_i$ is Normal with mean_____________ and variance________________.

8. (2 points) If U and V are two random variables, the covariance between the variables $mU + s$ and $nV + t$ in terms of $\text{Cov}(U, V)$ is:

(a) $\text{Cov}(mU + s, nV + t) = \text{Cov}(U, V)$

(b) $\text{Cov}(mU + s, nV + t) = mnst \times \text{Cov}(U, V)$

(c) $\text{Cov}(mU + s, nV + t) = mn \times \text{Cov}(U, V) + st$

(d) $\text{Cov}(mU + s, nV + t) = mn \times \text{Cov}(U, V)$

(e) $\text{Cov}(mU + s, nV + t) = \text{Cov}(U, V) + st$

(f) none of above

9. (2 points) The mean and the variance of a binomial distribution are 8 and 4, respectively. Then, $P(X = 1)$ is equal to:

(a) $\frac{1}{2^{12}}$

(b) $\frac{1}{2^{4}}$

(c) $\frac{1}{2^{6}}$

(d) $\frac{1}{2^{8}}$

(e) $\frac{1}{2^{0}}$

(f) none of above

10. (2 points) If X and Y are two Poisson variates such that $X \sim \text{Poisson}(1)$ and $Y \sim \text{Poisson}(2)$. Then, the probability $P(X + Y < 3)$ is:

(a) e^{-3}

(b) $1.5e^{-3}$

(c) $3e^{-3}$

(d) $8.5e^{-3}$

(e) $9e^{-3}$

(f) none of above

11. (2 points) The moment generating function of a random variable X is $M_X(t) = \frac{2}{5} + \frac{1}{3}e^{2t} + \frac{4}{15}e^{3t}$. The expected value of X is,

(a) 22/15

(b) 9/5

(c) 17/15

(d) 11/5

(e) 1

(f) none of above

12. (3 points) Given the joint probability density function $f(x, y) = 3 - x - y$ for $0 < x < y < 1$. The correlation coefficient between X and Y is

(a) -1/2

(b) 3/7

(c) -1/4

(d) -3/7

(e) 0

(f) none of above

With the Best Wishes