College of Computer Science & Engineering at Yanbu.

جامعة طيبة
TAIBAH UNIVERSITY

كلية علوم وهندسة الحاسبات
بينبع

Model Ans

Midterm 02

Form A

SECOND MID-TERM. **Exam**
Academic Year 1447 Hijri.- FIRST. **Semester**

Exam Information معلومات الامتحان			
Course name	الاحتمالات و الإحصاء الهندسي		اسم المقرر
Course Code	**STAT 301**		رمز المقرر
Exam Date	25/11/18		تاريخ الامتحان
Exam Time			وقت الامتحان
Exam Duration	**One houre and Quarter**	ساعة وربع	مدة الامتحان
Classroom No.			رقم قاعة الاختبار
Instructor Name			اسم استاذ المقرر

Student Information معلومات الطالب		
Student's Name		اسم الطالب
ID number		الرقم الجامعي
Section No.		رقم الشعبة
Serial Number		الرقم التسلسلي

General Instructions:

- Your Exam consists of **4 PAGES**
- You are **NOT** allowed to use any form of notes, textbooks, or electronic devices (such as mobile phones or tablets) during the exam
- **Calculators are allowed (Normal one).**
- Please read each question carefully and answer all parts as instructed.

تعليمات عامة:

- عدد صفحات الامتحان **4 صفحات**
- **يمنع** استخدام أي نوع من الملاحظات أو الكتب أو الأجهزة الإلكترونية (مثل الهواتف المحمولة أو الأجهزة اللوحية و الساعات الذكية) خلال الامتحان
- **يسمح باستخدام الالة الحاسبة العادية**
- يرجى قراءة كل سؤال بعناية والإجابة على جميع الأجزاء كما هو موضح

مع تمنياتنا لكم بالتوفيق
Good Luck

هذا الجزء خاص بأستاذ المادة
This section is ONLY for instructor

#	Course Learning Outcomes (CLOs)	Related Question (s)	Points	Final Score
CLO4	Distinguish between discrete, continuous random variables and probability distributions	Part 1	4	
COL6	Analyze measures of location and measures of variability	Part 2	4	
CLOS7	Find the properties of probability distributions.	Part 3	4	
CLO8	Compute probability models for a given problem.	Part 4	3	
CLO9	Implement probability methods to solve real-world problems.	Part 5	5	
Total			**20**	

Midterm 2 Exam

الاسم :
الشعبة :
الرقم الجامعي :

الرقم في الكشف

0	○ ○
1	○ ○
2	○ ○
3	○ ○
4	○ ○
5	○ ○
6	○ ○
7	○ ○
8	○ ○
9	○ ○

MCQ

Part 1

	A	B	C	D
1	○	●	○	○
2	○	○	●	○

Part 2

	A	B	C	D
3	○	○	●	○
4	○	○	●	○

Part 3

	A	B	C	D
5	○	○	○	●
6	○	○	●	○

Part 4

	A	B	C	D
7	●	○	○	○
8	○	●	○	○

Part 5

	A	B	C	D
9	○	○	●	○
10	○	○	○	●

Part 1: CLO4 ...../4 MARKS

MCQ: ...../2 MARKS

Q1: Suppose that the probability of event A is 0.4 and the probability of event B is 0.3, suppose A,B are independent, then p(B\A) = ...			
A. 0.4	B. 0.3	C.0.12	D. No one from above
Q2: Suppose that a sample space S consists of three simple events: A, B, C and D. That is, S = {A, B, C,D}. If P(C) = 0.30, P(B) = 0.15, P(A)=0.20 what is P(D)?			
A. 0.25	B. 0.15	C.0.35	D. 0.40

Essay: ...../2 MARKS

Write the definition of f(x), E(x) and F(x) for two Discrete probability distributions?

Bernoulli

$$f(x) = P(X=x) = \begin{cases} p & x=1 \\ 1-p & x=0 \\ 0 & \text{otherwise} \end{cases}$$

$$E(x) = p$$

$$F(x) = \begin{cases} 0 & x<0 \\ 1-p & 0 \le x < 1 \\ 1 & x \ge 1 \end{cases}$$

Binomial

$$f(x) = P(X=x) = \binom{n}{x} p^x (1-p)^{n-x}$$

$$E(x) = np$$

$$F(x) = P(X \le x) = \sum_{t=0}^{\lfloor x \rfloor} \binom{n}{t} p^t (1-p)^{n-t}$$

Part 2: CLO6 ...../3 MARKS

MCQ: ...../2 MARKS

Q3: The conditional probability of B, given A, is defined by $P(B\|A) = \frac{\dots\dots}{P(A)}$, provided $P(A) > 0$			
A) $P(B)$	B) $P(A)$	C) $P(A \cap B)$	D) $P(A \cup B)$
Q4: Let X be a random variable with probability distribution $f(x)$. The mean, or expected value, of X is $\mu = E(X) =$ ..... **if X is discrete.**			
A) $\sum_x f(x)$	B) $\int_{-\infty}^{\infty} x f(x)$	C) $\sum_x x f(x)$	D) $\int_{-\infty}^{\infty} f(x)$

Essay: ...../1 MARKS

Life insurance sales man sells on the average 3 life insurance policies per week. Use Poisson's law to calculate the probability that in a given week he will sell 2 or more policies but less than 5 policies.

$$\mu = 3$$

$$p(x) = \frac{e^{-\mu} \mu^x}{x!}$$

$$p(2 \le x < 5) = p(2) + p(3) + p(4)$$

$$= 0.61612$$

Part 3: CLO 7 ……\ 4 Mark

MCQ: ……/2 MARKS

Q5:Which of the following can't be considered probability			
A. 0.3	B. 0.5	C.0.25	D. 2
Q6: An event A will occur with probability 0.3. An event B will occur with probability 0.6, and P(A ∩ B)=0.2 suppose A and B are two dependent event. The probability of P(A U B)			
A. 0.4	B. 0.6	C. 0.7	D. 0.9

Essay: ……/2 MARKS

Let the random variable X to be the **subtraction** of the dots on the 2 dice

(1) Find X and the Sample Space S and Find the probability distribution f(*X*)

(2) Find variance of *X* V(X)=σ^2

1,1 1,2 1,3 1,4 1,5 1,6
2,1 2,2 2,3 ——— 2,6
⋮
6,1 ——— 6,6

$E(x) = \sum x p(x) = 1.944$

$V(x) \simeq 2.053$

x	Count	P(X=x)
0	6	1/6
1	10	5/18
2	8	2/9
3	6	1/6
4	4	1/9
5	2	1/18

Part 4: CLO8 ……\ 5 Mark

MCQ: ……/2 MARKS

Q7: A coin is tossed twice. The probability that at least 1 head occurs = ……			
A) 3/4	B) 1/4	C) 1	D) 2/4
Q8: The Variance value σ^2 of the discrete variable using Binomial distribution is:			
A) *np*	B) *npq*	C) *nq*	D) *n(1-p)*

Essay: ……\ 3 Mark

A club has 20 members How many ways are there to choose **4 members** of the club to serve on an executive committee? How many ways are there to choose a **president, vice president, secretary**, and **treasurer** of the club? **Write the form** اكتب القوانين

(1) choose 4 members from 20 (order does not matter)
This is a Combination $\binom{20}{4} = \frac{20!}{4!\,16!} = 4845$

(2) Choosing president, —, —, —
order Does matter
$P(20,4) = 20 \times 19 \times 18 \times 17 = 116,280$ ways

Part 5: CLO9 ...../ 4 Mark

MCQ: ...../ 2 Mark

Q9: Binomial probability function become Bernoulli probability function when the number of trials is equal:			
A) 3/4	B) 1/4	C) 1	D) 2/4
Q10: How many sample points are there in the sample space when **a pair** of dice is thrown once?			
A) 3	B) 6	C) 18	D) 36

Essay: ...../ 2 Mark

A factory manufactures pieces that are tested for validity by three workers. Worker 1 tests 60% of all pieces and has a 94% accuracy rate in identifying valid pieces, Worker 2 tests 30% of pieces with 98% accuracy, and Worker 3 tests 10% of pieces with 90% accuracy.

Find: (a) What is the probability that a randomly selected piece from the factory is valid?

(b) If a piece is found to be valid, what is the probability that it was tested by Worker 2?

(a) $P(\text{valid}) = \sum P(\text{worker}) * P(\text{valid} \mid \text{worker})$

Worker 1: $0.6 \times 0.94 = 0.564$

Worker 2: $0.3 \times 0.98 = 0.294$

Worker 3: $0.1 \times 0.9 = 0.09$

$P(\text{valid}) = 0.564 + 0.294 + 0.09 = 0.948$

(b) $P(W2 \mid \text{valid}) = \dfrac{P(W2) * P(\text{valid} \mid W2)}{P(\text{valid})}$

$= \dfrac{0.294}{0.948} = 0.310$