

University of Jordan
Mathematics Department

Principles of Statistics 0301131
First Exam/// 18/03/2009 5-6

الوقت:

المدرس:

الرقم الجامعي:

الاسم:

- In kgs, if the weights of male students are bell-shaped with mean 70 and variance 25, then the weight above which there are 16% of the students is
a. 85 b. 82 c. 75 d. 80
- The 30th percentile of the following data: 5, 9, 9, 2, 7, 6, 11, 7, is
a. 6 b. 5 c. 3.5 d. 5.5
- The following sample presents the grades of 10 student:

Class	Frequency
1-5	2
6-10	5
11-15	2
16-20	1

The variance is

- 22 b. 19 c. 20.21 d. 21.11
- If we roll a die twice, the probability that the sum of the two numbers appear is smaller than 7 and the first number is odd is
a. 11/36 b. 10/36 c. 9/36 d. 12/36
- If the grades of 400 students have mean 70 and standard deviation 6, then the number of students with grades outside the interval (61,79) is at most
a. 222 b. 170 c. 230 d. 178
- For a given data: $Q_1=28$, $Q_2=40$, and $Q_3=50$. If we multiply each observation by -3, then we add 10, the new Q_3 becomes
a. -74 b. -160 c. -140 d. -94
- Only one of the following statements is correct:
 - If the observations are skewed to the right then the mean is smaller than the mode.
 - $P(A \cap \bar{B}) \leq P(A \cap B)$, for any two events A, B in Ω .
 - For some data, if $Q_1=32$ and the range is 40, then Q_3 could be 74
 - If the variance of a sample data is zero then the range of this data is zero.

Essay

- Consider the following frequency table:

Grade	Number of Students
1-10	20
11-20	40
21-30	30
31-40	10

Find the number of students with grades greater than 27.

9. In a given sample of 10 students, the grades have mean 20 and variance 16, if we change a grade from 20 into 30. Find the sum of the squares of the new data $\left(\sum_{new} x_i^2\right)$.

10. Let A and B be two events in the sample space Ω . If $P(A) = 0.7$, $P(A \cap \bar{B}) = 0.4$, and $P(\bar{A} \cap \bar{B}) = 0.2$. Find $P(B)$.

#4

$$\frac{3 \cdot 2 \cdot 1 \cdot 2 \cdot 1}{5!}$$

University of Jordan
Department of Mathematics

$$\frac{3 \cdot 3 \cdot 2 \cdot 1 \cdot 2 \cdot 1}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

Student name (in Arabic):
Student number:

$\frac{3}{10}$

Version C

1) A sample of size 10 has mean 15 and variance 30. If an observation $x = 20$ in the sample is changed to 15 then the value of $\sum x^2$ of the sample after this change becomes
 a) 2930 b) 2520 c) 2695 d) 2446 e) 2345

2) Consider a frequency table with five classes and total frequency 25. Suppose that the cumulative frequency of the fourth class is 16. Then the relative frequency of the fifth class is
 a) 1.00 b) 0.36 c) 0.64 d) 0.20 e) 0.46

3) A multiple choice test consists of 10 questions. Suppose that only 4 randomly selected questions of this test will be graded. If a student answered only 6 questions correctly, find the probability that the student will get a full mark in this test.
 a) 1/14 b) 3/5 c) 2/5 d) 5/14 e) None of the above

4) A group of 5 students contains 3 brothers. All students in this group will be randomly seated in ordered chairs. Find the probability that the 3 brothers will be seated next to each other.
 a) 4/10 b) 2/10 c) 6/10 d) 3/10 e) None of the above.

5) The mean and standard deviation of a sample of size 100 are 10 and 2, respectively. The smallest possible number of observations that are between 6 and 14 is
 a) 61 b) 84 c) 75 d) 80 e) 65

6) A collection of observations X has mean μ_X and variance σ_X^2 . Let $Y = \frac{X - \mu_X}{\sigma_X}$. Then
 a) $\mu_Y = 1, \sigma_Y = 0$ b) $\mu_Y = 1, \sigma_Y = 1$ c) $\mu_Y = 0, \sigma_Y = 0$ d) $\mu_Y = 0, \sigma_Y = 1$ e) None of the above.

7) Find the variance S^2 of the following (grouped) sample

Class	-2 to 0	1 to 3	4 to 6	7 to 9
Frequency	2	1	3	2

8) The 20th percentile P_{20} of the scores of 200 students is 10 and the 90th percentile P_{90} of these scores is 85. The number of students who got scores between 10 and 85 is
 a) 180 b) 140 c) 160 d) 120 e) 150

9) If a sample of size 20 and mean 10 is combined with a sample of size 10 and mean 20, then the mean of the combined sample equals
 a) 20.0 b) 13.3 c) 14.1 d) 10.0 e) 15.0

Handwritten calculations and diagrams:

- Diagram showing a sequence of dots with arrows pointing to the right.
- Equation: $2(7)(1)(2)(1) + 2(2)(1)(2) + \dots$
- Equation: $\frac{4}{120} = \frac{1}{30}$
- Equation: $\frac{16}{120}$
- Equation: $\frac{90}{20} = 4.5$
- Equation: $\frac{85}{95} = 0.89$
- Equation: $\frac{10}{200} = 0.05$
- Equation: $\frac{10}{4} = 2.5$

10) For bell-shaped data. Suppose that the first quartile Q_1 equals 35 and that the interquartile range IQR equals 60, then the mode of the data equals

- a) 60 b) 85 c) 65 d) 75 e) 95

11) Find the 70th percentile P_{70} of the following data.

Class	-2 to 1	2 to 5	6 to 9	10 to 13
Frequency	5	4	4	2

- a) 8 b) 6.5 c) 7.5 d) 8.5 e) 7

12) The following are two classes of a frequency distribution

Class	Frequency
3.6 - 5.9	4
6.0 - 8.3	6

The actual limits of the first class are

- a) 3.55 - 6.85 b) 3.1 - 6.4 c) 3.65 - 5.85 d) 3.55 - 5.95 e) 3.6 - 5.9

13) Suppose that $P(A) = 0.6$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$. Find $P((A \cap \bar{B}) \cup B)$

- a) 0.6 b) 0.8 c) 0.7 d) 1 e) 0

14) The frequency of a randomly selected class of a frequency table is

- a) a qualitative random variable
 b) a continuous random variable
 c) a discrete random variable
 d) not a random variable
 e) always smaller than its cumulative frequency

	c.f
1	5
5	9
9	13
13	15

$$l = (0.7)(15) = 10.5 \uparrow \text{II}$$

$$\frac{13-9}{9-5} = \frac{11-9}{x-5}$$

$$4 \cdot 2 = x - 5 \Rightarrow x = 7$$

Make up Exam for Math 131 Test I
29-3-2011

Name _____ Student number _____ Section: _____ Serial number _____

suppose that the

1. The grades of 100 students have mean $\bar{X} = 55$ and standard deviation $S = 10$. At least how many students got grades between 30 and 80?

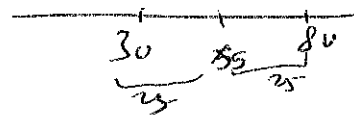
- a) 92 b) 90 c) 84 d) 86 e) 88

$$1 - \left(\frac{2}{5}\right)^2 = \frac{21}{25}$$

$$\bar{X} + Ks = 80$$

$$Ks = 25$$

$$K = 2.5$$

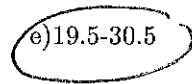
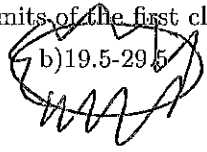


Class	frequency
20-30	12
31-41	15

2. The following are the first two classes of a frequency table together with their frequencies

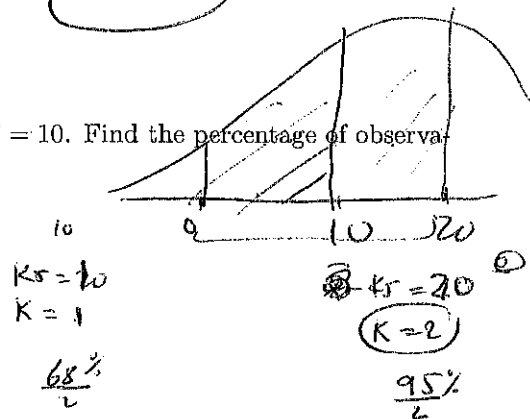
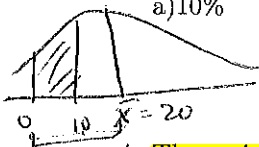
The actual limits of the first class are

- a) 15-35 b) 19.5-29.5 c) 20.5-29.5 d) 20.5-30.5 e) 19.5-30.5



3. A bell shaped sample data has mean $\bar{X} = 20$ and standard deviation $S = 10$. Find the percentage of observations in this sample data that are between 0 and 40.

- a) 10% b) 2.5% c) 25% d) 13.5% e) 16%



4. The variance of the sample data -2, -1, 0, 1, 2, 3 equals

- a) 4 b) 4.5 c) 3 d) 2.5 e) 3.5

$$Ks = 20$$

$$K = \frac{20}{10} = 2$$

$$Ks = 10$$

$$K = 1$$

$$\frac{68}{2} - \frac{68}{2} = \frac{27}{2}$$

$$\frac{68}{2}$$

$$\frac{95}{2}$$

5. A quiz results of a sample of 10 students are given in the following table

Class	frequency
2-4	3
5-7	6
8-10	1

The mean of this

sample equals

- a) 6.8 b) 6 c) 5.4 d) 7.1 e) 4.4

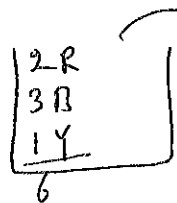
X	f	xf
3	3	9
6	6	36
9	1	9
	10	54

6. Find the percentage of observations that are less than 6 in

- a) 55% b) 30% c) 65% d) 60% e) none

7. A box contains 2 red, 3 blue and 1 yellow balls. Three balls are drawn from the box, one at a time without replacement. Find the probability of having a blue then a blue then a red ball.

- a) 0.4 b) 0.3 c) 0.5 d) 0.2 e) 0.1



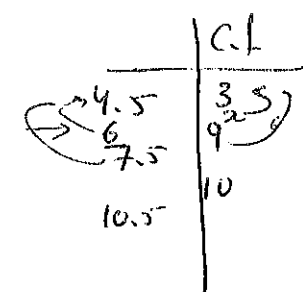
$$P(B \cap B \cap R) = \frac{3}{6} \cdot \frac{2}{5} \cdot \frac{2}{4}$$

$$= \frac{1}{5} \cdot \frac{1}{2} = \frac{1}{10}$$

$$\frac{2-3}{9-3} = \frac{6-4.5}{7.5-4.5}$$

$$\frac{2-3}{6} = \frac{1.5}{3}$$

$$\frac{2-1}{6} = \frac{1}{6}$$



$$n-1=3$$

$$n=6$$

8. A sample data contains 6 observations and has mean $\bar{X}=10$. The observation 13 in the sample is modified to 7. Find the mean of the new sample.

- a) 8 b) 7 c) 11 d) 10 e) 9

$$\sum X = n \bar{X}$$

$$= 6(10) = 60$$

$$\sum x_{\text{new}} = 60 - 13 + 7$$

$$= 54$$

$$\bar{x} = \frac{54}{6}$$

9. Find the third quartile of the following sample data.

- a) 16 b) 14 c) 13 d) 12 e) 15

X	frequency
16	4
12	5
11	4
6	3

10. Suppose that $P(A) = 0.7$, and $P(B) = 0.5$, and $P(A \cup B) = 0.8$ then $P(\bar{A} \cap B)$ equals

- a) 0.2 b) 0.15 c) 0.1 d) 0.3 e) 0.4

$Q_3 = 75^{\text{th}}$

$$l = nP$$

$$= 16 \left(\frac{3}{4} \right) = 12$$

	f	c.f
6	3	3
11	4	7
12	5	12
16	4	16
	<u>16</u>	

$$P(A) + P(B) - P(A \cap B) = 0.8$$

$$P(A \cap B) = 1.2 - 0.8$$

$$= 0.4$$

	A	\bar{A}	
B	0.4	0.1	0.5
\bar{B}			
	0.7		

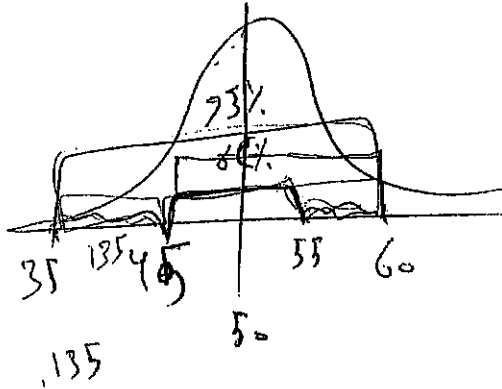
** If the distribution of weights of 200 students has the mean 50kgs. and s.d. 5 kgs.

11. The number of students with weights exceed 60 kgs. is approximately:

- a) at least 75 b) at least 150 c) at most 50 d) at most 25 e) at most 150

12. If the distribution is bell-shaped, then the number of students with weights between 45 and 60 kgs. is approximately:

- a) 82 b) 163 c) 136 d) 190 e) 195



$\frac{2}{5}$ $\frac{3}{5}$ $\frac{1}{5}$

** A box contains 2 White and 3 Black balls. If 2 balls are drawn from the box with replacement and x = number of White balls drawn then

13. $P(x=0) =$

- a) 0.16 b) 1.2 c) 0.8 d) 0.48 e) 0.36

14. $E(X) =$

- a) 0.8 b) 0.36 c) 0.16 d) 0.48 e) 1.2

15. Variance of $X =$

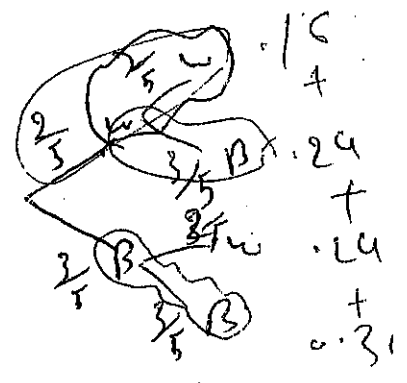
- a) 0.16 b) 0.36 c) 0.48 d) 0.8 e) 1.2

W	B
2	3

$$\{E(X^2) - (E(X))^2\} = \{E(X^2) - (E(X))^2\}$$

$$= \sum x^2 P(x) - (\sum x P(x))^2$$

$$= 0.25^2 + \dots$$



** If X takes the values $-1, 0, 1$ and $EX = 1/3$, $P(x=0) = 1/3$ then

16. $P(X = 1) =$

- a) $1/3$ b) $1/2$ c) $1/6$ d) $4/9$ e) $5/9$

17. $E(X^2 + 3X - 2) =$ $\{E(X^2) + 3E(X) - 2$

$3 \frac{1}{3} - 2$
 \rightarrow
 $X - 1$

- a) $-1/3$ b) $1/3$ c) $4/9$ d) $5/9$ e) $-5/9$

** Given the joint probability distribution of X and Y .

	y			
		0	1	2
x				
0		0.1	0.3	0.05
1		0.2	0.25	0.1

$0.55 + 2(0.15)$

18 $P(x=y) = P(x=0, y=0) + P(x=1, y=1)$ $0.1 + 0.25$

- a) 0.15 b) 0.35 c) 0.65 d) 0.55 e) 0.85

19 $E(Y) =$

- a) 0.85 b) 0.35 c) 0.55 d) 0.65 e) 0.25



University of Jordan

Math. 131

Date: 13/11/2011

DEPT OF MATH

EXAM 1

TIME: 60 MIN.

Student Name: _____

Student Number: _____

Instructor Name: _____

Section Number: _____

Answer Sheet

3
2011
16-201

- | | | | | | | | | | |
|----|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-----|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 1- | a | b | <input checked="" type="radio"/> c | d | 9- | <input checked="" type="radio"/> a | b | c | d |
| 2- | <input checked="" type="radio"/> a | b | c | d | 10- | a | b | c | <input checked="" type="radio"/> d |
| 3- | <input checked="" type="radio"/> a | b | c | d | 11- | a | b | <input checked="" type="radio"/> c | d |
| 4- | a | <input checked="" type="radio"/> b | c | d | 12- | a | <input checked="" type="radio"/> b | c | d |
| 5- | <input checked="" type="radio"/> a | b | c | d | 13- | a | b | c | <input checked="" type="radio"/> d |
| 6- | a | b | c | <input checked="" type="radio"/> d | 14- | a | b | <input checked="" type="radio"/> c | d |
| 7- | a | <input checked="" type="radio"/> b | c | d | 15- | a | b | <input checked="" type="radio"/> c | d |
| 8- | a | <input checked="" type="radio"/> b | c | d | 16- | a | <input checked="" type="radio"/> b | c | d |

Answer each of the following questions and put "X" on the correct choice on front page

* **For Questions (1)-(3):** A sample of 200 items is taken randomly. The mean and standard deviation of their weights are respectively, 40 and 6 Kgs. Also first quartile $Q_1=20$ and third quartile $Q_3=75$.

(1) The smallest number of items with weights inside $[28, 52]$

- (a) 112 (b) 50 (c) 150 (d) 88

(2) If each weight is multiplied by -2 and 3.5 is added, then third quartile Q_3 of the coded data becomes:

- (a) -36.5 (b) 43.5 (c) -153.5 (d) -146.5

(3) If one item with weight 1045 Kgs. was added to the sample, the new sample mean is

- (a) 45 Kgs. (b) 34.95 Kgs. (c) 40 Kgs. (d) 35 Kgs.

* **For Questions (4)-(7):** Given the following information:

Box I: contains 2 Red (R) and 4 Black (B) balls

Box II: contains 3 Red (R) and 3 Black (B) balls.

One box is chosen randomly with probability $1/2$ and then one ball is drawn without replacement.

(4) $P(\text{drawn ball is black} \mid \text{Box II was chosen}) =$

- (a) $1/4$ (b) $1/2$ (c) $2/3$ (d) $1/3$

(5) $P(\text{drawn ball is black})$

- (a) $7/12$ (b) $5/12$ (c) $1/3$ (d) $2/3$

(6) $P(\text{Box II is drawn} \mid \text{ball drawn is black}) =$

- (a) $3/5$ (b) $2/5$ (c) $4/7$ (d) $3/7$

(7) If two balls are drawn from Box II without replacement, what is the probability that one of them is black

- (a) $8/15$ (b) $3/5$ (c) $1/3$ (d) $2/15$

* **For Questions (8)-(11):** In a random experiment, $P(A \cap \bar{B}) = 0.4$, $P(A \cap B) = 0.1$, $P(B) = 0.3$.

(8) $P(A \cup B) =$

- (a) 0.6 (b) 0.7 (c) 0.8 (d) 0.9

(9) $P(\bar{A} | B) =$

- (a) 2/3 (b) 1/3 (c) 1/2 (d) 1/4

(10) $P(A | \bar{B}) =$

- (a) 3/7 (b) 1/2 (c) 1/3 (d) 4/7

(11) $P(\bar{A} \cap \bar{B}) =$

- (a) 0.4 (b) 0.6 (c) 0.3 (d) 0.7

* **For Questions (12)-(15):** The joint probability distribution of X and Y is given by

		Y		
		0	1	2
X	0	1/6	0	1/6
	1	0	1/6	1/6
	2	1/6	1/6	0

Also given that $E(X) = E(Y) = 1$, $VAR(X) = VAR(Y) = 2/3$ and $Cov(X, Y) = -1/3$

(12) $Corr(X, Y) =$

- (a) 1/2 (b) -1/2 (c) -1/4 (d) 3/4

(13) $Cov(1-3X, -2Y) =$

- (a) 2 (b) 6 (c) -6 (d) -2

(14) $E(4X-3Y^2-2) =$

- (a) 1 (b) -1 (c) -3 (d) 3

(15) $Var(X+Y-1) =$

- (a) 1/3 (b) 1 (c) 2/3 (d) 4/3

(16) For the following data 5, 10, 15, 15, 15, 30, 30, 30, 30, 1000, which measure of central tendency would be the least useful

- (a) median (b) mean (c) mode (d) variance

A



Name: _____ Number: _____ Serial No. _____

Instructor's name: _____ Section (day and time): _____

Mark with an X the symbol that represents the correct answer. Each question is worth 1.5 marks.

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
a	a	X	X a	a	a	X a	a	a	a	X a	a	a	a
b	b	b	b	b	b	X b	b	X b	b	b	X b	b	b
X	X	c	c	X c	c	X c	c	c	c	c	c	c	c
d	d	d	d	d	d	X d	X d	d	d	d	d	X d	d
e	e	e	e	e	X e	X e	e	e	X e	e	e	e	X e

Questions 1 and 2 are based on the following sample data:

Q1) The mean of this sample equals

- a) 7.4 b) 8.4 c) 9.4 d) 10.4 e) 11.4

Q2) The proportion of observations that are less than 12 equals

- a) 0.48 b) 0.58 c) 0.68 d) 0.76 e) 0.86

Class	Frequency
0 - 4	4
5 - 9	8
10 - 14	10
15 - 19	3
Total	25

Questions 3 and 4 are based on the following sample data

x	3	4	5	6	7	Total
frequency	7	9	8	5	3	32

Q3) The mode of this sample data equals

- a) 4 b) 7 c) 3 d) 6 e) 5

Q4) The median of this sample data equals

- a) 4.5 b) 6.5 c) 7 d) 3.5 e) 5.5

Q5) In a Statistics test 8 % of the students got grades less than 70. If the first quartile Q_1 of the grades is 30, then the proportion of students who got grades between 30 and 70 equals

- a) 0.45 b) 0.50 c) 0.55 d) 0.60 e) 0.65

Q6) For a bell shaped sample data with mean 20 and standard deviation 5, the percentage of observations that are between 25 and 30 is about

- a) 0.5% b) 10.5% c) 15.5% d) 2% e) 13.5%



13

Name:

Number:

Serial No.

Instructor's name:

Section (day and time):

Mark with an \times the symbol that represents the correct answer. Each question is worth 1.5 marks.

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
a	a	a	a	a	a	a	a	a	a	a	a	a	a
b	b	b	b	b	b	b	b	b	b	b	b	b	b
c	c	c	c	c	c	c	c	c	c	c	c	c	c
d	d	d	d	d	d	d	d	d	d	d	d	d	d
e	e	e	e	e	e	e	e	e	e	e	e	e	e

Questions 1 and 2 are based on the following sample data:

Q1) The mean of this sample equals

- a) 7.4 b) 8.4 c) 9.4 d) 10.4 e) 11.4

Q2) The proportion of observations that are less than 12 equals

- a) 0.48 b) 0.58 c) 0.68 d) 0.76 e) 0.86

Class	Frequency
0 - 4	4
5 - 9	3
10 - 14	10
15 - 19	8
Total	25

Questions 3 and 4 are based on the following sample data

x	6	7	8	9	10	Total
frequency	2	5	9	8	8	32

Q3) The mode of this sample data equals

- a) 9 b) 10 c) 7 d) 6 e) 8

Q4) The median of this sample data equals

- a) 6.5 b) 7.5 c) 8.5 d) 9.5 e) 10

Q5) In a Statistics test 75% of the students got grades less than 70. If the first quartile Q_1 of the grades is 30, then the proportion of students who got grades between 30 and 70 equals

- a) 0.65 b) 0.60 c) 0.55 d) 0.50 e) 0.45

Q6) For a bell shaped sample data with mean 20 and standard deviation 5, the percentage of observations that are between 25 and 35 is about

- a) 0.5% b) 10.5% c) 15.5% d) 2% e) 13.5%

In a Math test, the mean score is 18 and the standard deviation is 6. Answer questions 7, 8 and 9

Q7) the proportion of students who got grades between 11.5 and 25.5 is at least
a) 0.36 b) 0.56 c) 0.47 d) 0.80 e) 0.67

Q8) at least 64% of the grades are in the interval
a) (2,22) b) (8,28) c) (10,30) d) (5,25) e) (6,26)

Q9) If each score is multiplied by 3 then 10 is added (i.e., new score = 3 old score + 10), then the mean and standard deviations of the new scores equal
a) 56;18 b) 70;24 c) 98;30 d) 82;24 e) 64;18

Q10) Let A, B be independent events such that $P(A) = P(B)$. If $P(A \cap B) = 0.49$, then the probability $P(A \cap \bar{B})$ (i.e., the probability of A and not B) equals
a) 0.09 b) 0.24 c) 0.21 d) 0.06 e) 0.16

Q11) A box contains 9 cards numbered from 1 to 9. Two cards are randomly drawn from this box without replacement. If the number on the first card is less than 4, then the probability that the number on the second card is (also) less than 4 equals
a) $3/8$ b) $1/4$ c) $1/2$ d) $6/8$ e) $5/8$

Q12) A team of 8 students is randomly selected from a class that contains 5 girls and 7 boys. The probability that this team contains exactly 2 girls equals
a) 0.1414 b) 0.2424 c) 0.4545 d) 0.5656 e) 0.3535

Q13) In how many ways can we award a gold, a silver and a bronze medal to three people among 7 participants?
a) 504 b) 210 c) 120 d) 336 e) 406

Q14) If a sample data is skewed to the left (i.e., positively skewed), then
a) median < mode < mean
b) median < mean < mode
c) mode < mean < median
d) mean < median < mode
e) mode < median < mean.

2019 زائره

وقت المحاضرة:

الامتحان الأول

مبادئ الإحصاء

الرقم الجامعي:

الاسم:

Part 1 : Fill in the rectangular box with the correct answer. Show your work. Answers without solution details are not accepted.

1) (2 marks) Find the 60th percentile P_{60} for following grouped sample data.

Class	Frequency	c.f.
4-8.5	5	5
9-13.5	9	14
14-18.5	2	16
19-23.5	4	20
Total	20	

$$l = 12$$

$$\frac{x - 8.5}{13.5 - 8.5} = \frac{12 - 5}{14 - 8.5}$$

$$\frac{x - 8.5}{5} = \frac{7}{9}$$

12.39

$$x = 8.5 + \frac{35}{9}$$

x = 12.39

	c.f.
8.5	5
13.5	14
18.5	16

2) (2 marks) The mean of 50 observations is 85. If an observation was incorrectly recorded 150 instead of 15, then the correct mean equals

$n = 50$

82.3

$$\sum_{i=1}^n x_i = 85(50) = 4250$$

$$\text{new } \sum x_i = 4250 - 150 + 15 = 4115$$

$$\bar{x}_{\text{new}} = \frac{4115}{50} = 82.3$$

3)(2 marks) If $P(A)=0.65$, $P(B)=0.25$ and $P(A|B)=0.6$, answer a and b

a) (2 marks) $P(A \cap B) =$

b) (2 marks) $P(A \cup \bar{B}) =$

Part 2: Identify the choice that best completes the statement or answers the question.

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
a	a	a	a	a	a	a	a
b	b	b	b	b	b	b	b
c	c	c	c	c	c	c	c
d	d	d	d	d	d	d	d
e	e	e	e	e	e	e	e

1) Find the median of the sample represented by the following relative frequency table

X	relative frequency
1	0.15
2	0.25
3	0.40
4	0.10
5	0.10

a) 2 b) 1.5 c) 3 d) 4 e) 2.5

2) The grades of a Math test are bell shaped. If 95% of students grades are in the interval $[48,72]$, then the mean and the standard deviation of the math grades are

a) $\bar{X} = 62, S = 6$ b) $\bar{X} = 60, S = 6$ c) $\bar{X} = 65, S = 5$ d) $\bar{X} = 60, S = 10$
e) $\bar{X} = 64, S = 8$

- 3) The mean and the standard deviation of a set of data are 30 and 5 respectively. If each observation is multiplied by 3 and then 4 is added to the result. Then, the mean and the standard deviation of the transformed data are:
- a) $\bar{X} = 120, S = 20$ b) $\bar{X} = 30, S = 5$ c) $\bar{X} = 123, S = 20$
d) $\bar{X} = 120, S = 5$ e) $\bar{X} = 94, S = 15$
- 4) According to Chebyshev's rule, the proportion of observations within 2 standard deviations of the mean is:
- a) At least 75% b) At most 75% c) At least 25% d) At most 25% e) Exactly 25%
- 5) A password consists of 4 digits is to be formed from the numbers 2, 3, 4, 5, 6, 7. What is the probability that the first digit in the password is even?
- a) 1/2 b) 3/7 c) 1/7 d) 3/14 e) 1/6
- 6) If two balls are selected at random without replacement from a box containing 5 red and 7 black balls, then the probability that the two balls are of different colors is:
- a) 70/132 b) 35/132 c) 70/144 d) 35/144 e) 62/132
- 7) If the upper class limits of the first two classes in a frequency table with equal class widths are 20 and 30, respectively, then, the midpoint (center) of the first class is
- a) 14.5 b) 15 c) 15.5 d) 14 e) 26
- 8) If $P(A) = 0.2$, $P(B) = 0.5$, and if A and B are independent, then $P(A \cup B)$ equals
- a) 0.5 b) 0.6 c) 0.9 d) 0.3 e) 0.7

Student Name: _____

Student Number: _____

Included

Instructor Name: _____

Section Number: _____

* For Questions (1)-(5): Given the data: -4, 4, -3, 3, -2, 2, 0.

-4 -3 -2 0 (2) 34

(1) The mean is $\boxed{0}$

(2) The Standard deviation is $\sqrt{\frac{58}{6}} = \sqrt{9.67} = \boxed{3.11}$

(3) The 70th percentile is $0.7 \times 7 = 4.9 \approx 5 \rightarrow P_{70} = \boxed{2}$

(4) If one number is added to the list and its value was 10, then the mean of the new list is $\frac{10}{8} = \boxed{1.25}$

(5) If each number is multiplied by -2 and then 10 is added to all numbers, the range of the new list is $2(8) = \boxed{16}$

* For Questions (6)-(7): The mean and standard deviation of the grades in a general exam are 60 and 6, respectively.

(6) If the distribution is bell-shaped, then the proportion of grades below 72 is $\boxed{0.975}$

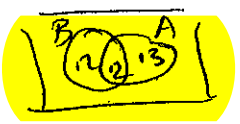
(7) The proportion of grades outside [51, 69] is $\frac{1}{1.5} = \boxed{0.44}$

* For Questions (8)-(10): Let A and B be any two events such that $P(A) = 0.5$ and $P(B) = 0.4$. Then

(8) If A and B are disjoint then $P(A \cup B) = 0.5 + 0.4 = \boxed{0.9}$

(9) If $P(\bar{B} | A) = 0.4$, $P(A \cup B) = 0.5 + 0.4 - 0.3 = \boxed{0.6}$

(10) If $P(\bar{A} \cap B) = 0.2$, $P(A \cup B) = P(A \cap B) = 0.2$, $P(A \cup B) = \boxed{0.7}$



* For Questions (11)-(13): The joint probability distribution of X and Y is given by

Q11-18

are not included

		Y		
		1	2	3
X	0	0.05	0.15	0
	1	0.10	0.20	0.20
	2	0.05	0.25	0

$$(11) E(Y) = 1(0.2) + 2(0.6) + 3(0.2) = 2$$

$$(12) P(X=Y) = 0.1 + 0.25 = 0.35$$

$$(13) P(X < 2 | Y < 2) = \frac{(0.05 + 0.1)}{0.2} = \frac{0.15}{0.2} = \frac{3}{4} = 0.75$$

* For Questions (14)-(18): Let (X, Y) be bivariate random variable such that $E(X)=3$, $E(Y)=5$, $\text{Var}(X)=4$, $\text{Var}(Y)=9$ and $\text{Cov}(X, Y)=-1$. Then

$$(14) E(Y^2 + 2Y - 5) = 9 + 25 + 2(5) - 5 = 39$$

$$(15) E(XY) = -1 + 15 = 14$$

$$(16) \text{Var}(3Y - 2X + 5) = 9(9) + 4(4) - 12(-1) = 109$$

$$(17) \text{Cov}(3 - X, 2 + 3Y) = -3(-1) = 3$$

$$(18) \text{Corr}(5X - 2, 2 + 3Y) = \frac{\text{Cov}(X, Y)}{2(3)} = \frac{-1}{6}$$

* For Questions (19)-(20): 40% and 60% of students of the faculty of science are females and males, respectively. Assume that 70% of females are passing Math.131 in the faculty of science, while 60% of males are passing Math.131.

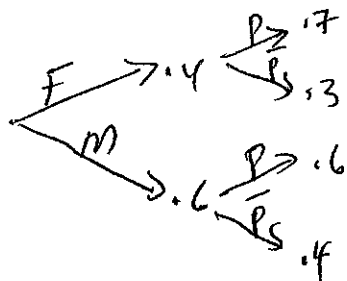
This question is included

(19) If a student is taken randomly, what is the probability that the student will pass Math.131?

$$(0.4)(0.7) + (0.6)(0.6) = 0.28 + 0.36 = 0.64$$

(20) If a student passed Math.131, what the probability that he is male?

$$\frac{0.36}{0.64} = \frac{9}{16} = 0.5625$$



Part 1 : Fill in the rectangular box with the correct answer. Show your work. Answers without solution details are not accepted.

1) Based on the following grouped sample data, answer a and b

Class	Frequency	cum freq
3-9	4	4
10-16	8	12
17-23	10	22
24-30	3	25
Total	25	

a) Find the median of the sample.

$$\begin{aligned}
 nP &= 25 \times 0.5 = 12.5 \quad \left(\frac{1}{2}\right) \\
 M &= 17.5 + \frac{(12.5 - 12)}{10} \times 7 \quad (1) \\
 &= 17.5 + 0.35 = 17.85 \quad \left(\frac{1}{2}\right)
 \end{aligned}$$

17.85

b) Find the proportion of the sample that is .

less than 20.

$$\begin{aligned}
 20 &= 17.5 + \left(\frac{25P - 12}{10}\right)(7) \quad (1) \\
 25P &= \frac{10}{7} (20 - 17.5) + 12 = 15.57 \\
 P &= \frac{15.57}{25} = 0.62 \quad \left. \vphantom{P} \right\} (1)
 \end{aligned}$$

0.62

2) Suppose that 30% of those who passed the calculus exam are males and that 25% of males passed the calculus exam. If 40% of students performed the exam are males, then answer a and b.

لنفرض أن ٣٠% من الذين يجتازون امتحان تفاضل وتكامل هم من الذكور وأن ٢٥% من الذكور يجتازون امتحان تفاضل وتكامل. إذا كان ٤٠% من الطلاب الذين أدوا الامتحان هم من الذكور فأجب عن ما يلي:

a. If a student is selected at random, what is the probability that he passed the calculus exam.

0.3

اخترنا طالبا عشوائيا ، ما احتمال أنه اجتاز الامتحان؟

$$\begin{aligned}
 P(M|S) &= 0.30 \\
 P(S|M) &= 0.25 \\
 P(M) &= 0.4
 \end{aligned}
 \quad \text{①}$$

$$P(M|S) = \frac{P(S|M)P(M)}{P(S)} \quad \left(\frac{1}{2}\right) \text{②}$$

$$P(S) = \frac{P(S|M)P(M)}{P(M|S)} = \frac{(0.25)(0.4)}{0.30} = 0.33 \quad \left(\frac{1}{2}\right)$$

b. What is the percentage of passing the calculus exam amongst female students?

ما هي نسبة النجاح في التفاضل والتكامل بين الطالبات؟

0.385

$$P(S|\bar{M}) = \frac{P(\bar{M}|S)P(S)}{P(\bar{M})} \quad \text{①}$$

$$= \frac{(0.7)(0.33)}{0.6} \quad \text{②}$$

$$= 0.385$$

Part 2: Identify the choice that best completes the statement or answers the question.

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
a	a	a	a	a	a	a	a
b	b	b	b	b	b	b	b
c	c	c	c	c	c	c	c
d	d	d	d	d	d	d	d
e	e	e	e	e	e	e	e

1) The mean of 20 observations is 35. If an observation was incorrectly recorded 15 instead of 35, then the correct mean equals

- a) 36 b) 35 c) 34 d) 31 e) 30

2) The grades of a Math test are bell shaped. If 95% of students grades are in the interval [48,72], then the mean and the standard deviation of the math grades are

- a) $\bar{X} = 62, S = 6$ b) $\bar{X} = 60, S = 6$ c) $\bar{X} = 65, S = 5$ d) $\bar{X} = 60, S = 10$
 e) $\bar{X} = 64, S = 8$

3) The average Calculus grade is 12 with standard deviation 3. Assuming that the grades are bell-shaped distributed, then the proportion of students with grades 9 to 18 is:

- a) 0.185 b) 0.975 c) 0.84 d) 0.815 e) 0.475

4) A password consists of 4 digits is to be formed from the numbers 2, 3, 4, 5, 6, 7. What is the probability that the first digit in the password is even and the last digit is greater than 4?

$(\frac{1}{2})(\frac{1}{2})$

- a) 1/4 b) 1/2 c) 2/7 d) 3/14 e) 1/6

5) If the proportion of observations within k standard deviations of the mean is at least 88%, then k equals (approximately)

- a) 1 b) 1.5 c) 2 d) 2.5 e) 3

6) If $P(A) = 0.35$, $P(B) = 0.45$, and if A and B are disjoint, then $P(\bar{A} \cap \bar{B})$ equals

- a) 0.3 b) 0.5 c) 0.2 d) 0.4 e) 0.35

7) If $P(A) = 0.65$, $P(B) = 0.25$ and $P(A|B) = 0.6$, then $P(A \cap B)$ equals

- a) 0.2 b) 0.25 c) 0.3 d) 0.125 e) 0.15

8) Categorical data may be presented graphically by:

- a. histogram b. ogive c. polygon d. bar chart e. frequency curve

M6

103131 First Test
Name (in Arabic):

Instructor's name:
Id. Number:

- (1) This exam consists of 14 multiple-choice questions .
(2) Mark, with an \times , the correct answer to each question on the following

Q1	a	b	c	d	e
Q2	a	b	c	d	e
Q3	a	b	c	d	e
Q4	a	b	c	d	e
Q5	a	b	c	d	e
Q6	a	b	c	d	e
Q7	a	b	c	d	e
Q8	a	b	c	d	e
Q9	a	b	c	d	e
Q10	a	b	c	d	e
Q11	a	b	c	d	e
Q12	a	b	c	d	e
Q13	a	b	c	d	e
Q14	a	b	c	d	e

- 1) Find the percentage of observations that are less than 15 in the following (grouped) sample data

Class	2-5	6-9	10-13	14-17
Frequency	5	3	1	4

- a) 85.137% b) 91.218% c) 80.769% d) 88.117% e) 76.513%

- 2) The following are the first two classes of a frequency table together with their frequencies

20 - 30	12
31 - 41	15

The actual limits of the first class are

- a) 20.5 - 30.5 b) 15 - 35 c) 19.5 - 29.5 d) 19.5 - 30.5 e) 20.5 - 29.5

- 3) A sample data of size 80 has mean $\bar{X} = 30$ and a standard deviation $S_x = 8$. Suppose that each observation X in this sample data has been coded according to the equation $Y = 2 - 2X$. Find an interval that contains at least 60 observations of the new observations Y .

- a) [-90, -26] b) [14, 46] c) [-46, -14] d) [-45, -13] e) [26, 90]

- 4) A quiz results (out of 10) are given in the following table

Class (grades)	Cumulative frequency
0-2	3
3-5	11
6-8	20
9-10	24

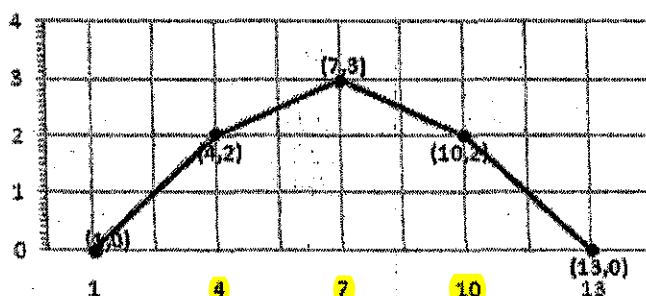
The relative frequency of the second class (3-5) equals

- a) $11/24$ b) $1/3$ c) $3/11$ d) $1/4$ e) $3/8$

- 5) A sample data of size 10 has mean $\bar{X} = 10$ and standard deviation $S = 10$. An observation $X_1 = 12$ was mistakenly recorded as 8 and another observation $X_2 = 6$ was mistakenly recorded as 10. Find the correct value of $\sum X^2$ of the data.

- a) 1946 b) 1936 c) 1926 d) 1956 e) 1916

- 6) An observation is randomly selected from a grouped sample data represented by the following frequency polygon. Find the probability that this observation is less than or equal to 8.



- a) $5/7$ b) $8/13$ c) $7/13$ d) $3/7$ e) $6/7$

$$67 - 9 = \frac{58}{7}$$

- 7) Consider a collection of observations (measured to the nearest integer) with minimum observation = 9 and maximum observation 67. If we wish to organize these observations using frequency table of 7 classes of equal widths then the width of each class equals

- a) 10 b) 8 c) 9 d) 8.3 e) 8.2

- 8) Let p be the proportion of smokers in a random group of 10 people. Then p

- a) is a qualitative random variable
 b) is not a random variable
 c) is a continuous random variable
 d) is a discrete random variable
 e) may have any value between 0 and 1 (including 0 and 1)

الوقت:

المدرس:

الرقم الجامعي:

الاسم:

1. The following sample presents the grades of 10 student:

Class	Frequency
1-5	2
6-10	5
11-15	2
16-20	1

The variance is

- a. 20.21 b. 21.11 c. 19 d. 22
2. Only one of the following statements is correct:
- a. $P(A \cap \bar{B}) \leq P(A \cap B)$, for any two events A, B in Ω .
- b. If the observations are skewed to the right then the mean is smaller than the mode.
- c. For some data, if $Q_1 = 32$ and the range is 40, then Q_3 could be 74
- d. If the variance of a sample data is zero then the range of this data is zero.
3. If we roll a die twice, the probability that the sum of the two numbers appear is smaller than 7 and the first number is odd is
- a. 10/36 b. 11/36 c. 12/36 d. 9/36
4. The 30th percentile of the following data: 5, 9, 9, 2, 7, 6, 11, 7, is
- a. 5.5 b. 6 c. 3.5 d. 5
5. If the grades of 400 students have mean 70 and standard deviation 6, then the number of students with grades outside the interval (61, 79) is at most
- a. 178 b. 222 c. 170 d. 230
6. For a given data: $Q_1 = 28$, $Q_2 = 40$, and $Q_3 = 50$. If we multiply each observation by -3, then we add 10, the new Q_3 becomes
- a. -74 b. -94 c. -160 d. -140
7. In kgs, if the weights of male students are bell-shaped with mean 70 and variance 25, then the weight above which there are 16% of the students is
- a. 80 b. 82 c. 85 d. 75

Essay

8. In a given sample of 10 students, the grades have mean 20 and variance 16, if we change a grade from 20 into

30. Find the sum of the squares of the new data $\left(\sum_{new} x_i^2 \right)$.

$$\sum x_i^2 = 4644$$

9. Let A and B be two events in the sample space Ω . If $P(A) = 0.7$, $P(A \cap \bar{B}) = 0.4$, and $P(\bar{A} \cap \bar{B}) = 0.2$. Find $P(B)$.

$$X = 79.5$$

$$\# \text{ of students} \approx 21$$

10. Consider the following frequency table:

Grade	Number of Students
1-10	20
11-20	40
21-30	30
31-40	10

Find the number of students with grades greater than 27.

$$P(B) = 0.4$$

وقت المحاضرة:

الرقم الجامعي:

الاسم:

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
d	d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
e	e	e	e	e	e	e	e	e	e	e	e	e	e	e	e

3(4)

x_i	f	$x_i \cdot f$	$x_i^2 \cdot f$
3	4	12	36
6	3	18	108
9	2	18	162
12	1	12	144
	10	60	350

1) Find the variance S^2 of the following (grouped) sample

Class	2 to 4	5 to 7	8 to 10	11 to 13
Frequency	4	3	2	1

- a) 10 b) 8 c) 6 d) 7 e) 9

2) Find the third quartile Q_3 of the following (grouped) sample data

Class	3-6	7-10	11-14	15-18
Frequency	3	2	1	4

- a) 17 b) 16.5 c) 16 d) 15.5 e) 17.5

3) Let $Y = 2 - 3X$. Suppose that X is bell shaped with mean 0 and first quartile -5. Find the first quartile of Y .

- a) 5 b) -13 c) -17 d) -5 e) 17

4) Consider the following bivariate distribution

	Y	-1	1	
X	-1	0.2	0.1	0.3
	0	0.1	0.2	0.3
	1	0.1	0.3	0.4
		0.4	0.6	

Then $Cov(X, Y)$ equals

- a) 0.29 b) 0.25 c) 0.27 d) 0.26 e) 0.28

$$E_{XY} = 0.2(-1)(-1) + 0.1(-1)(1) + 0.1(0)(-1) + 0.2(0)(1) + 0.1(1)(-1) + 0.3(1)(1) = 0.3$$

$$E_X = -0.3 + 0.4 = 0.1$$

$$E_Y = 0.2$$

$$\mu = 0$$

$$Q_1 = -5$$

$$Y = 2 - 3X$$

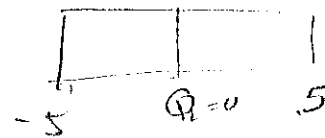
$$P_{25} = 2 - 3P_{75}$$

$$= 2 - 3(5) = 2 - 15 = -13$$

$l = 0.75(10) = 7.5$

$$Cov(X, Y) = 0.3 - (0.1)(0.2)$$

$$IQR = Q_3 - Q_1$$



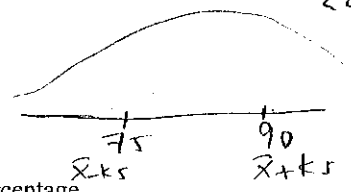
$$\text{Corr}(X, Y) = \frac{\text{Cov}(X, Y)}{\sqrt{\text{Var}(X) \text{Var}(Y)}}$$

$$\text{Var}(X+Y) = \text{Var}(X) + \text{Var}(Y) + 2\text{Cov}(X, Y)$$

$$\geq \text{Var}(X) + \text{Var}(Y) \quad \text{Cov} > 0$$

$$\leq \text{Var}(X) + \text{Var}(Y) \quad \text{Cov} < 0$$

- 5) If $\text{Var}(X) + \text{Var}(Y) > \text{Var}(X+Y)$, then
- a) $\text{Cov}(X, Y) = 0$
 - b) $\text{Corr}(X, Y) > 0$
 - c) X and Y are independent.
 - d) $\text{Corr}(X, Y) < 0$
 - e) $\text{Cov}(X, Y) > 0$



- 6) A bell shaped sample data has mean $\bar{X} = 60$ and standard deviation $S = 15$. Find the percentage of observations in this sample data that are between 75 and 90.
- a) 25%
 - b) 16%
 - c) 10%
 - d) 13.5%
 - e) none
- 7) The mean and standard deviation of a sample of size 100 are 15 and 3, respectively. The smallest possible number of observations that are between 6 and 24 is
- a) 88
 - b) 75
 - c) 79
 - d) 93
 - e) 94
- 8) If $P(A|B) = 0.3$, $P(A \cap B) = 0.2$ and $P(B) = 0.4$, then $P(A)$ equals
- a) 0.42
 - b) 0.22
 - c) 0.52
 - d) 0.12
 - e) 0.32
- 9) A sample data contains 10 observations and has mean $\bar{X} = 8$. The observation 10 in the sample is modified to 5. Find the mean of the new sample.
- a) 4.5
 - b) 6.5
 - c) 5.5
 - d) 7.5
 - e) 8.5

88.9

Handwritten calculations for question 7:

$$80 - 15k = 75 \Rightarrow k = 1$$

$$60 + 15k = 90 \Rightarrow k = 2$$

- 10) Find the percentage of observations that are less than 12 in the following table.

Class	3-6	7-10	11-14	15-18
Frequency	4	2	2	2

- a) 72.5%
- b) 82.5%
- c) 67.5%
- d) 77.5%
- e) 62.5%

- 11) Consider the following cumulative frequency table

Class	f	Cumulative Frequency
2-5	6	6
6-9	6	12
10-13	8	20

The relative frequency of the third class is 20

- a) 0.8
- b) 0.4
- c) 0.5
- d) 0.7
- e) 0.6

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

$$0.2 = P(A|B) \cdot 0.4 \Rightarrow P(A|B) = 0.5$$

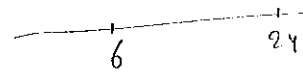
$$P(A \cap \bar{B}) = P(A) - P(A \cap B) = 0.2$$

$$P(A) - 0.12 = 0.2$$

$$P(A) = 0.32$$

$n = 100$

$\bar{x} = 15$ $S = 3$



$$15 - 3k = 6$$

$$15 - 6 = 3k$$

$$15 + 3k = 24$$

$$3k = 9$$

$$k = 3$$

$k = 3$

$$1 - \frac{1}{9} = \frac{8}{9}$$

$\sum x_i = 80$

$$80 - 10 + 5 = 75$$

10

	cf
6.5	4
10.5	6
14.5	8
18.5	10

$$\frac{8-6}{4} = \frac{x-6}{12-10.5}$$

$$\frac{1}{2} = \frac{x-6}{1.5}$$

$$2x - 12 = 1.5$$

$$2x = 13.5$$

$$x = 6.75$$

$\left. \begin{matrix} 4R \\ 2B \end{matrix} \right\}$
 Plastic
 $P_1 = \frac{1}{6}$
 $P(R) = \frac{4}{6}$

$\left. \begin{matrix} 3R \\ 3B \end{matrix} \right\}$
 Paper bag
 $P_2 = \frac{5}{6}$
 $P(R) = \frac{3}{6}$

12) A plastic bag contains 4 red and 2 black balls. A paper bag contains 3 red and 3 black balls. A fair die will be thrown. If the outcome of the thrown die is 6 then one ball is drawn from the plastic bag, while if the outcome of the thrown die is anything else then one ball is drawn from the paper bag. Find the probability that the drawn ball is red.

- a) 19/36 b) 5/12 c) 7/12 d) 7/36 e) 12/19

$$P(R) = P(R, \text{Plastic}) + P(R, \text{Paper})$$

$$= \frac{4}{6} \cdot \frac{1}{6} + \frac{3}{6} \cdot \frac{5}{6} = \frac{4}{36} + \frac{15}{36} = \frac{19}{36}$$

13) Consider the following bivariate distribution

	Y	-1	1
X	-1	0.2	0.1
	0	0.1	0.2
	1	0.1	0.3

Then $P(X = -1 | Y = 1)$ equals

- a) 2/3 b) 1/2 c) 1/3 d) 1/5 e) 1/6

14) A quiz results of a sample of 10 students are given in the following table

Class	f	F	Cumulative frequency
2-4	3	3	3
5-7	6	6	9
8-10	1	7	10

The mean of this sample equals

- a) 6.1 b) 7.1 c) 5.4 d) 4.4 e) none

15) A box contains 2 black and 5 white balls. If 3 balls are randomly drawn from the box, then the probability of getting at least one black ball equals

- a) 1/7 b) 4/7 c) 2/7 d) 3/7 e) 5/7

16) A sample data contains 10 observations and has mean $\bar{X} = 8$ and variance $S^2 = 20$. The observations 8 and 12 are added to the sample to make a new sample. Find $\sum x^2$ of the observations in the new sample.

- a) 728 b) 1028 c) 1328 d) 918 e) 1118

$1 - P(\text{none}) = 1 - \frac{5}{7} \cdot \frac{4}{6} \cdot \frac{3}{5}$

$1 - \left(\frac{5}{7}\right)^3$

$n = 10$ $\bar{X} = 8$ $S^2 = 20$
 $8 \ \& \ 12$

$$P(X \geq 1) = P(X=1) + P(X=2)$$

$$= \frac{2}{7} + \frac{1}{7} = \frac{3}{7}$$

$$S'^2 = \frac{\sum x^2 - n\bar{x}^2}{n-1}$$

$$\sum x^2 = (n-1)S^2 + n\bar{x}^2$$

$$= 9(20) + 10(8)^2 + 8^2 + (12)^2$$