

Form 3

First Exam

Math 131

7-11-2012

Name \_\_\_\_\_

Student number \_\_\_\_\_

Section: \_\_\_\_\_

Serial number \_\_\_\_\_

Fill the rectangular box with the correct final answer.  
Answers without solution details are not accepted.

For questions 1-3. Consider the following table that represents a quiz results for 10 students

Class	frequency	$\Sigma x$	$\Sigma f$
3-5	3	4	12
6-8	6	7	42
9-11	1	10	10
		10	64

1. Find the actual limits of the first class

$(2.5 - 5.5)$

2. Find the mean of this sample

6.4

$$\frac{64}{10}$$

5.5	3
6	2
8.5	1
11.5	10

3. Find the percentage of observations that is less than 6

40%

$$\frac{x-3}{9-3} = \frac{6-5.5}{8.5-5.5}$$
$$\frac{x-3}{6} = \frac{0.5}{3}$$

$$\Rightarrow x = 4 \Rightarrow \frac{4}{10} \times 100$$

4. Find the variance of the sample data -2, -1, 0, 1, 2

2.5

$$\frac{2(4+1)}{4} = \frac{5}{2} = 2.5$$

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

0.1

$$P(A \cap B) = 0.4$$





X	F	CF
5	3	3
10	5	8
13	4	12
16	2	14

Form 3

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

X	frequency
16	2
10	5
13	4
5	3

$$l = np = 14(0.75) = 10.5 \uparrow n$$

7. A box contains 5 red, 2 blue and 3 yellow balls. 3 balls are drawn, one at a time without replacement.

Find the probability of having a red then a blue then a red ball.

5R
2B
3Y
10

$$\frac{5}{10} \cdot \frac{2}{9} \cdot \frac{4}{8}$$

$$\frac{1}{18} = 0.056$$

For questions 8-9. Consider a bell-shaped sample data. With mean 50 and standard deviation 14. Suppose that the sample data is coded to  $Y = 1 - 2x$

8. Find the mean  $\bar{Y}$

$$\bar{Y} = -99$$

$$\bar{Y} = 1 - 2(50) = 1 - 100$$

9. Find the 16th percentile of the coded data (i.e.  $P_{16}(Y)$ )

$$P_{16}(Y) = 1 - 2P_{84}(X) = 1 - 2(64) = -127$$

$$P_{84}(X) = X + 5 = 50 + 14 = 64$$

10. Suppose we have two boxes, Box A contains 4 red and 2 black balls, while box B contains 3 red and 3 black balls. One box is selected and one ball is drawn at random from that box. If the probability of selecting box A is  $\frac{1}{3}$  and the probability of selecting box B is  $\frac{2}{3}$ . What is the probability that the drawn ball is red?

A
4R
2B

B
3R
3B

$$\frac{5}{9} = 0.555$$

$$P(A) = \frac{1}{3}$$

$$P(B) = \frac{2}{3}$$

$$P(R|A) = \frac{4}{6}$$

$$P(R|B) = \frac{3}{6}$$

$$\frac{1}{3} \left( \frac{4}{6} \right) + \frac{2}{3} \left( \frac{3}{6} \right) = \frac{4}{18} + \frac{6}{18} = \frac{10}{18} = \frac{5}{9}$$

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Name	Student number	Section	Serial number
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1. A set of exam marks has mean 60, median 55, IQR=20 and standard deviation=13 marks. It is decided to subtract 8 from all the marks. For the new set of marks,

(a) What is the mean?

(b) what is the median?

(c) what is the IQR?

(d) What is the standard deviation?

2. Find the third quartile of the following sample data

X	Frequency
6	3
11	4
14	5
16	4



3. A sample data with size 81 has mean  $\bar{X} = 100$  and standard deviation  $S = 20$ . At least how many observations in the sample data are between 70 and 130? 45

4. Suppose that the mean of a population is 30. Assume the standard deviation is known to be 4 and that the frequency distribution is known to be bell-shaped.

Approximately what percentage of measurements fall in the interval ( 26, 38 ) 81.5%

5. From a group of 5 men and 7 women, how many different committees consisting of 3 men and 2 women can be formed?  $\binom{5}{3}\binom{7}{2} = 210$

6. The probability that a student passes Mathematics is  $\frac{2}{3}$  and the probability that he passes English is  $\frac{4}{9}$ . If the probability that he will pass at least one subject is  $\frac{2}{5}$ , what is the probability that he will pass both subjects?  $\frac{14}{45}$

الدُّكْوَرَةُ حَادِ الْكَيْمِ

أَيْ د. أَسَدُ الْكَلْبِ



Key Form 2

First Exam

Math 131

Summer 10-11

Name \_\_\_\_\_ Student number \_\_\_\_\_ Section \_\_\_\_\_ Serial number \_\_\_\_\_

1. A set of exam marks has mean 70, median 65, IQR=25 and standard deviation=15 marks. It is decided to subtract 10 from all the marks. For the new set of marks,

$$Y = X - 10$$

$$\bar{x} = 70$$
$$\text{Median} = 65$$

$$\text{IQR} = 25$$
$$S = 15$$

(a) What is the mean?

60

(b) what is the median?

55

(c) what is the IQR?

25

(d) What is the standard deviation?

15

2. Find the third quartile of the following sample data

X	Frequency	f
6	3	3
11	4	7
14	5	12
18	4	16

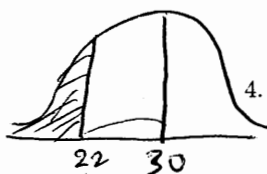
$$\frac{14 + 18}{2} = 16$$



Form 2

3. A sample data with size 54 has mean  $\bar{X} = 100$  and standard deviation  $S = 20$ . At least how many observations in the sample data are between 70 and 130?  obs.

$n = 54$   
 note, up to 100  
 } each side is 15  
 (31) not 15

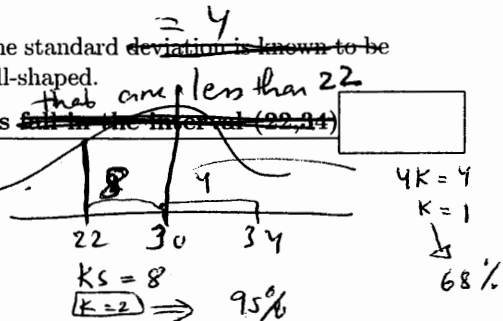


4. Suppose that the mean of a population is 30. Assume the standard deviation is known to be 4 and that the frequency distribution is known to be bell-shaped.

Approximately what percentage of measurements ~~fall in the interval (22, 34)~~

$\bar{X} = 30$

$S = 4$   
 2.5%



5. From a group of 5 men and 7 women, how many different committees consisting of 3 men and 2 women can be formed?

1. 20  
 →

1. 20  
 ↙

6. The probability that a student passes Mathematics is  $\frac{2}{3}$  and the probability that he passes English is  $\frac{4}{9}$ . If the probability that he will pass at least one subject is  $\frac{4}{5}$ , what is the probability that he will pass both subjects?

7. If  $P(A) = 0.25$ ,  $P(B) = 0.5$ , compute  $P(A|B)$  in the following cases:

(a) If A and B are disjoint, then  $P(A|B) =$

(b) If A and B are independent, then  $P(\bar{A}|B) =$



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Name	Student number	Section	Serial number
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1. A set of exam marks has mean 70, median 65, IQR=25 and standard deviation=15 marks. It is decided to subtract 10 from all the marks. For the new set of marks,

(a) What is the mean?

60

(b) what is the median?

55

(c) what is the IQR?

25

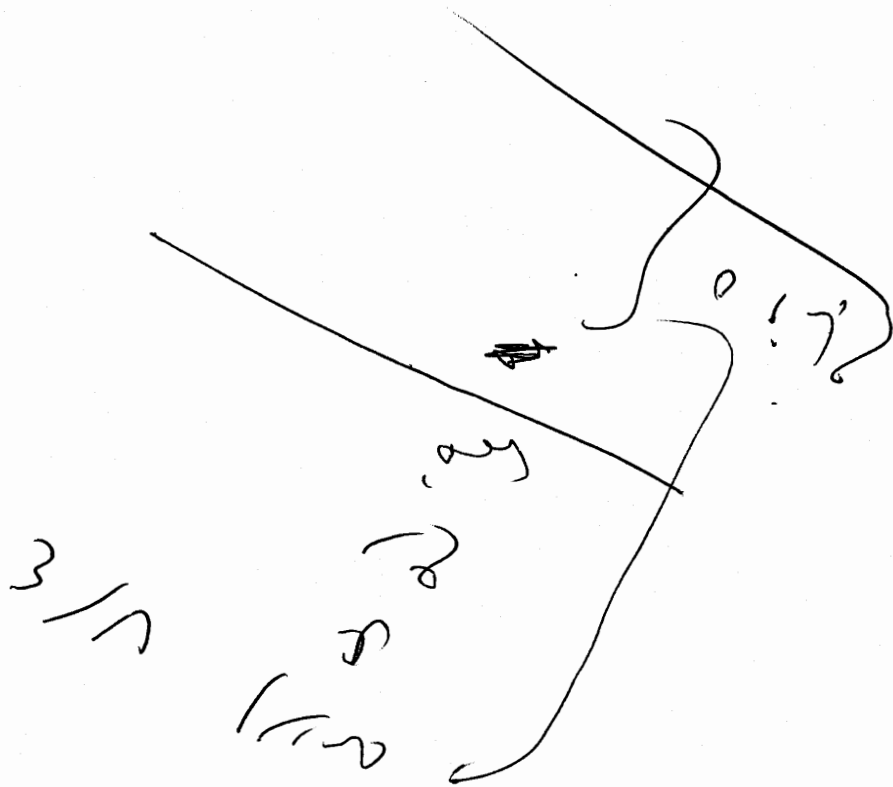
(d) What is the standard deviation?

15

2. Find the third quartile of the following sample data

X	Frequency
6	3
11	4
14	5
18	4

16



~~1/20~~

3. A sample data with size 54 has mean  $\bar{X} = 100$  and standard deviation  $S = 20$ . At least how many observations in the sample data are between 70 and 130? 30

4. Suppose that the mean of a population is 30. Assume the standard deviation is known to be 4 and that the frequency distribution is known to be bell-shaped.

Approximately what percentage of measurements fall in the interval (22,34) 81.5%

5. From a group of 5 men and 7 women, how many different committees consisting of 2 men and 3 women can be formed?  $\binom{5}{2} \binom{7}{3} = 350$

6. The probability that a student passes Mathematics is  $\frac{2}{3}$  and the probability that he passes English is  $\frac{4}{9}$ . If the probability that he will pass at least one subject is  $\frac{4}{5}$ , what is the probability that he will pass both subjects?  $\frac{14}{45}$

7

Baye

Baye





Form ①

3. A sample data with size 81 has mean  $\bar{X} = 100$  and standard deviation  $S = 20$ . At least how many observations in the sample data are between 70 and 130?

$$Ks = 30$$

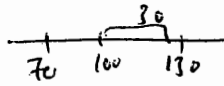
$$K = \frac{30}{20} = 1.5$$

$$1 - \frac{1}{(1.5)^2}$$

$$n = 81$$

$$\bar{X} = 100$$

$$S = 20$$

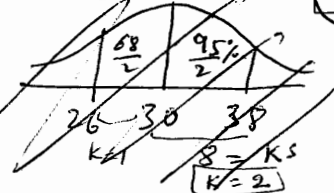
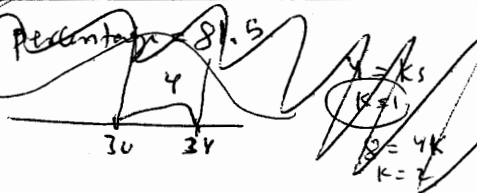
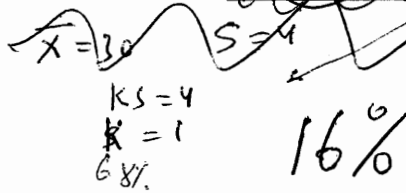


$\boxed{0.556}$

45  
0.67  
46.5

4. Suppose that the mean of a population is 30. Assume the standard deviation is known to be 4 and that the frequency distribution is known to be bell-shaped.

Approximately what percentage of measurements fall in the interval (26, 38)?



$\boxed{81.5\%}$

5. From a group of 5 men and 7 women, how many different committees consisting of 2 men and 3 women can be formed?

$$\boxed{\binom{5}{2} \binom{7}{3}}$$

6. The probability that a student passes Mathematics is  $\frac{2}{3}$  and the probability that he passes English is  $\frac{4}{9}$ . If the probability that he will pass at least one subject is  $\frac{2}{5}$ , what is the probability that he will pass both subjects?

$$\boxed{\frac{32}{45} = 0.711}$$

$$P(M) = \frac{2}{3}$$

$$P(E) = \frac{4}{9}$$

$$P(M \cup E) = \frac{2}{5}$$

$$P(M \cap E) = P(M) + P(E) - P(M \cup E)$$

$$= \frac{2}{3} + \frac{4}{9} - \frac{2}{5}$$

7. If  $P(A) = 0.5$ ,  $P(B) = 0.25$ , compute  $P(A|B)$  in the following cases:

(a) If A and B are disjoint, then  $P(A|B) = \boxed{0}$

(b) If A and B are independent, then  $P(A|B) = \boxed{0.5}$



Form 1

Name \_\_\_\_\_ Student number \_\_\_\_\_ Section: \_\_\_\_\_ Serial number \_\_\_\_\_

For questions 1-3 consider the following table that represents a quiz results for 10 students

Class	frequency	$x$	$xf$
3-5	4	4	16
6-8	2	7	14
9-11	4	10	40
	10		70

1. find the actual limits of the first class  $(2.5 - 5.5)$

2. Find the mean of this sample  $\frac{70}{10} = 7$

3. Find the percentage of observations that are less than 6  $43.3\%$

Handwritten calculations for question 3:

	cf
5.5	4
8.5	6
11.5	10

$\frac{x-y}{6-4} = \frac{6-5.5}{8.5-5.5}$   
 $\frac{x-4}{2} = \frac{0.5}{3}$

4. Find the variance of the sample data  $-4, -2, 0, 2, 4$   $10$

$\bar{x} = 0$   
 $\frac{2(16) + 2(4)}{4} = \frac{40}{4} = 10$

5. Suppose that  $P(A) = 0.6$ , and  $P(B) = 0.4$ , and  $P(A \cup B) = 0.8$ . Find  $P(\bar{A} \cap B)$   $0.2$

$P(A \cap B) = 0.6 + 0.4 - 0.8 = 0.2$   
 $P(B \cap \bar{A}) = P(B) - P(A \cap B) = 0.4 - 0.2 = 0.2$



6. A box contains 3 red, 4 blue and 2 yellow balls. 3 balls are drawn, one at a time without replacement.

Find the probability of having a red then a blue then a red ball.

$$\frac{3}{9} \cdot \frac{4}{8} \cdot \frac{2}{7} = \frac{1}{21}$$

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

		cf
5	4	4
10	5	9
15	4	13
16	2	15

X	frequency
5	2
10	5
15	4
5	4

15

$$l = np = 11.25$$

For questions 3-4. Consider a bell-shaped sample data. with mean 30 and standard deviation 14. Suppose that the sample data is coded to  $Y = 1 - 2x$

8. Find the mean  $\bar{Y}$

-59

9. Find the 16th percentile of the coded data (i.e.  $P_{16}(Y)$ )

-87

$$x_{84} = 44$$

$$(-2)(44)$$

10. Suppose we have two boxes, Box A contains 2 red and 4 black balls, while box B contains 3 red and 3 black balls.

One box is selected and from that box we draw one ball at random. If the probability of selecting box A is  $1/6$  and the probability of selecting box B is  $5/6$ . What is the probability that the drawn ball is

red?

$$\frac{17}{36} = 0.472$$

$$\frac{1}{6} \left( \frac{2}{6} \right) + \frac{5}{6} \left( \frac{3}{6} \right) = \frac{2}{36} + \frac{15}{36} = \frac{17}{36}$$



Summary

First Exam

Math 131

Fall 2012-2013

Name \_\_\_\_\_

Student number \_\_\_\_\_

Section: \_\_\_\_\_

Serial number \_\_\_\_\_

For questions 1-3 consider the following table that represents a quiz results for 10 students

Class	frequency	$x$	$xf$
3-5	2	4	8
6-8	4	7	28
9-11	4	10	40
			<u>76</u>

1. find the actual limits of the ~~first~~ <sup>last</sup> class

8.5 - 11.5

2. Find the mean of this sample

7.6

$$\frac{76}{10} = 7.6$$

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

26.67%

$x$	cf
5.5	2
6	6
8.5	10
11.5	14

$$\frac{0.5}{3} = \frac{x-2}{4}$$

4. Find the variance of the sample data -5, -2, 0, 2, 5

14.5

$$\frac{2(25) + 2(4)}{4} = \frac{50 + 8}{4} = \frac{58}{4}$$

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

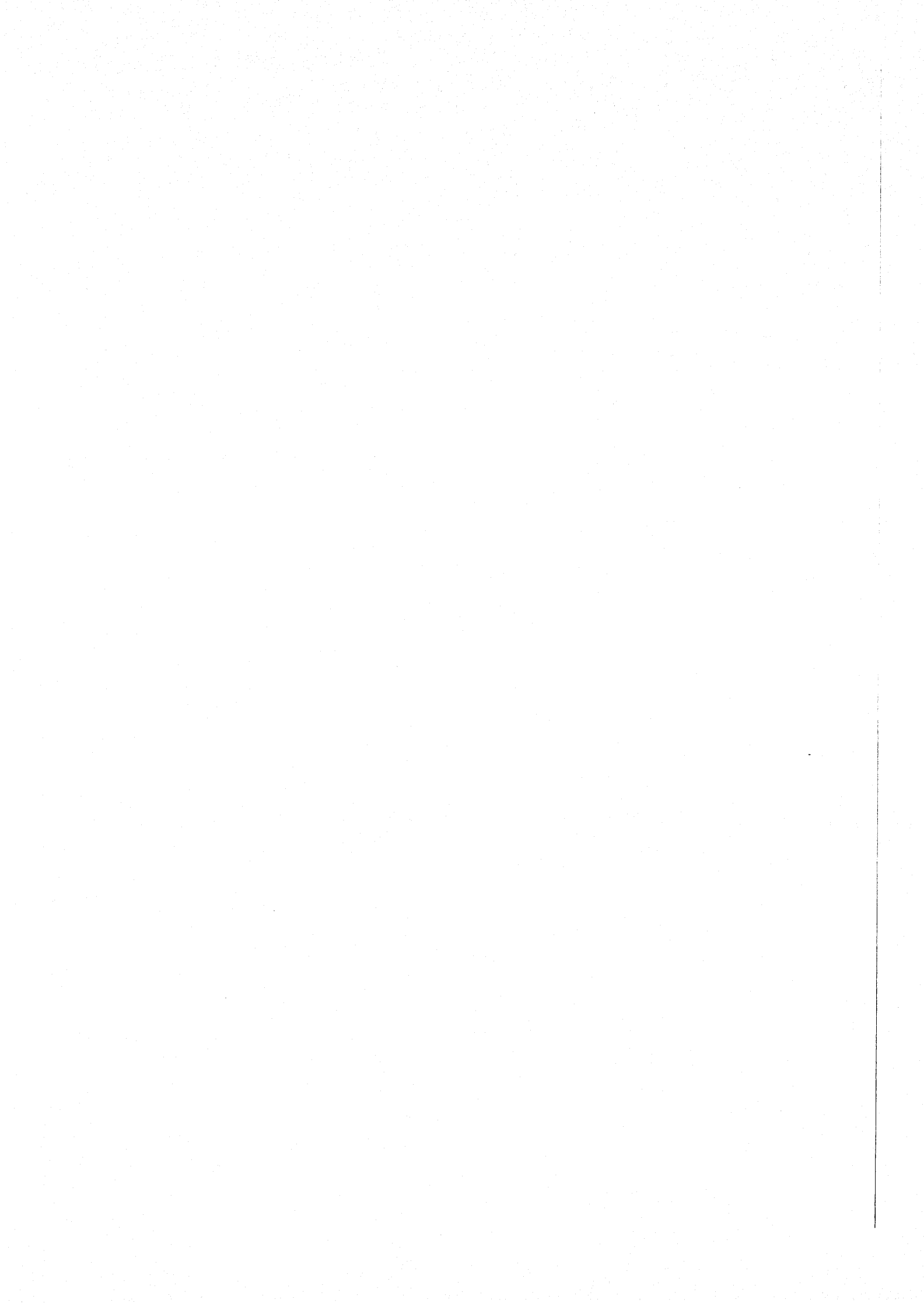
0.3

$$P(A \cap B) = 0.7 + 0.5 - 0.8$$

P(A \cap B) = 0.4

$$P(A \cap \bar{B}) = P(A) - P(A \cap B) = 0.7 - 0.4 = 0.3$$

	B	$\bar{B}$
A	0.4	0.3
$\bar{A}$	0.1	0.4





6. A box contains 4 red, 3 blue and 1 yellow balls. 3 balls are drawn, one at a time without replacement.

Find the probability of having a red then a blue then a red ball.

$$\frac{4}{8} \cdot \frac{3}{7} \cdot \frac{3}{6} = \frac{3}{28}$$

16	2
8	3
14	4
5	1

16	2
8	3
14	4
5	1
12	

	P	C
5	3	4
8	3	4
14	4	4
16	2	4

X	frequency
13	2
16	5
10	4
5	3

$$14$$

7. Find the 10th quartile of the following sample data.

$$l = 10\left(\frac{3}{4}\right)$$

$$l = 10\left(\frac{3}{4}\right) = 7.5 \uparrow 8$$

For questions 3-4. Consider a **bell-shaped** sample data. with mean 60 and standard deviation 14. Suppose that the sample data is coded to  $Y = 1 - 2x$

8. Find the mean  $\bar{Y}$

$$-119$$

$$1 - 2(74)$$

9. Find the 16th percentile of the coded data (i.e.  $P_{16}(Y)$ )

$$-147$$

$$X_{84} = \bar{x} + k_s = 74$$

10. Suppose we have two boxes, Box A contains 4 red and 2 black balls, while box B contains 3 red and 3 black balls. One box is selected and from that box we draw one ball at random. If the probability of selecting box A is  $1/6$  and the probability of selecting box B is  $5/6$ . What is the probability that the drawn ball is red?

red?

$$\frac{19}{36} \approx 0.528$$

4R
2B

3R
3B

$$P(A) = \frac{1}{6}$$

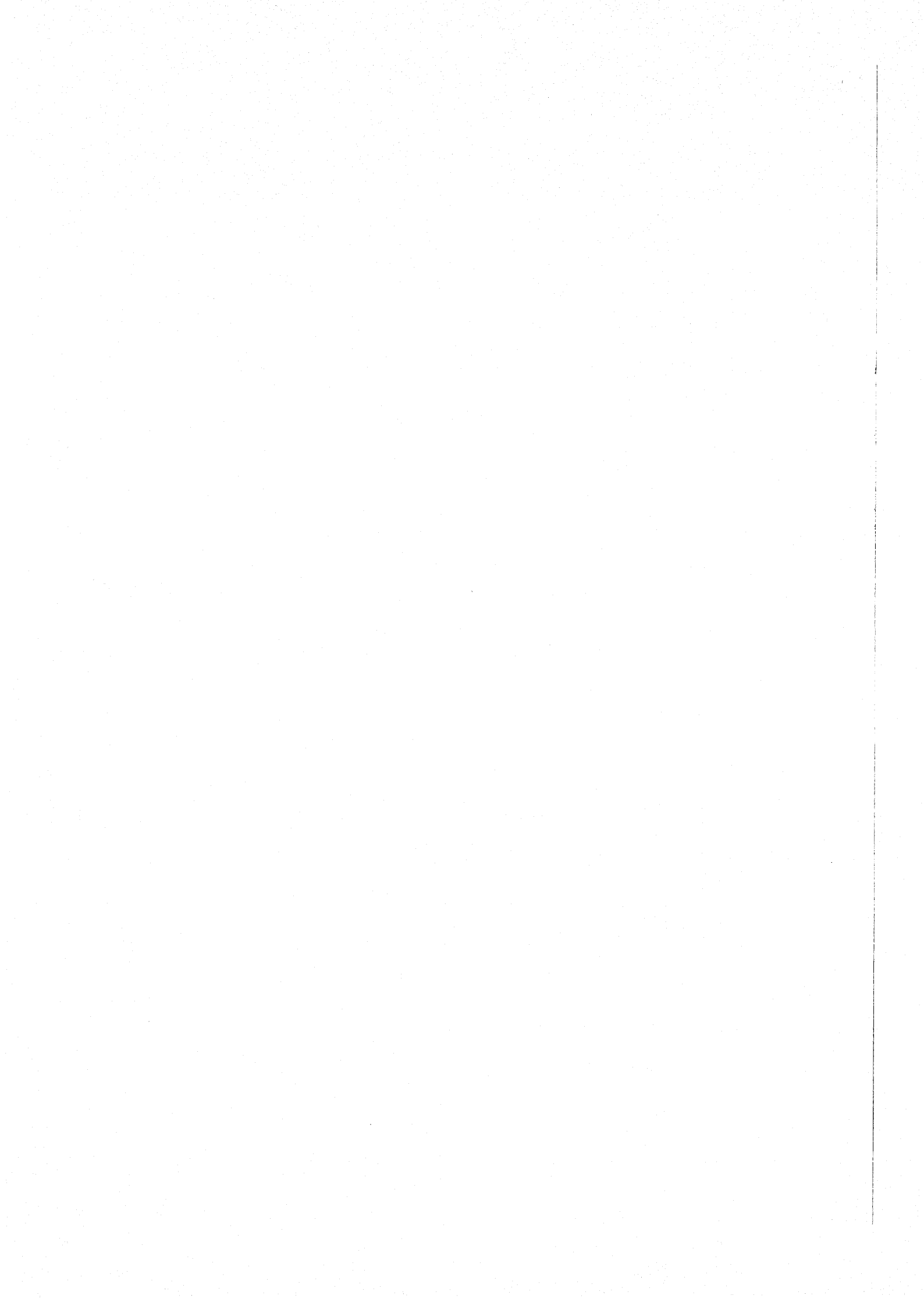
$$P(B) = \frac{5}{6}$$

$$\frac{4}{6}$$

$$\frac{3}{6}$$

$$\frac{1}{6} \cdot \frac{4}{6} + \frac{5}{6} \cdot \left(\frac{3}{6}\right)$$

$$\frac{4}{36} + \frac{15}{36} = \frac{19}{36}$$



Form 1

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

F	CF
5	3
9	5
11	4
16	2

X	frequency
16	2
9	5
11	4
5	3

11

$$L = np = 14 \left( \frac{3}{4} \right) = \frac{21}{2} = 10.5 \uparrow 11$$

7. A box contains 2 red, 1 blue and 3 yellow balls. 3 balls are drawn, one at a time without replacement.

Find the probability of having a red then a blue then a red ball.

$\frac{1}{60} = 0.016$

$$P(RBR) = \frac{2}{6} \cdot \frac{1}{5} \cdot \frac{1}{4}$$

$\frac{1}{60}$

2R  
1B  
3Y  
Total = 6

For questions 8-9. Consider a bell-shaped sample data. With mean 40 and standard deviation 14. Suppose that the sample data is coded to  $Y = 1 - 2x$

8. Find the mean  $\bar{Y}$

-79

$$\bar{Y} = 1 - 2(40)$$

9. Find the 16th percentile of the coded data (i.e.  $P_{16}(Y)$ )

-107

$$P_{16}(Y) = 1 - 2P_{84}(X) = 1 - 2(54)$$

$$X_{84} = \bar{X} + S = 40 + 14 = 54$$

10. Suppose we have two boxes, Box A contains 4 red and 2 black balls, while box B contains 4 red and 2 black balls. One box is selected and one ball is drawn at random from that box. If the probability of selecting box A is  $\frac{2}{3}$  and the probability of selecting box B is  $\frac{1}{3}$ . What is the probability that the drawn ball is red?

A  
4R  
2B

B  
4R  
2B

$\frac{4}{6} = \frac{2}{3}$

$$P(A) = \frac{2}{3}$$

$$P(R|A) = \frac{4}{6}$$

$$P(B) = \frac{1}{3}$$

$$P(R|B) = \frac{4}{6}$$

$$P(R) = \frac{4}{6} \left( \frac{2}{3} \right) + \frac{1}{3} \left( \frac{4}{6} \right) = \frac{4}{6} (1)$$

$$\begin{aligned} & \cancel{P(A)} + P \\ & P(A) - P(A \cap B) \\ & \cancel{P(A)} = [P(A) + P(A) - P(A \cup B)] \end{aligned}$$



Form 1

First Exam

Math 131

7-11-2012

Name \_\_\_\_\_ Student number \_\_\_\_\_ Section: \_\_\_\_\_ Serial number \_\_\_\_\_

Fill the rectangular box with the correct final answer.  
Answers without solution details are not accepted.

For questions 1-3. Consider the following table that represents a quiz results for 10 students

Class	frequency	$x$	$xf$
3-5	1	4	4
6-8	5	7	35
9-11	4	10	40
			79

1. Find the actual limits of the first class (2.5 - 5.5)

2. Find the mean of this sample 7.9

$$\frac{79}{10}$$

3. Find the percentage of observations that is less than 6 18.3%

	c.f	
5.5	1	←
→ 6	6	
8.5	6	
11.5	10	

$$\frac{x-1}{6-1} = \frac{6-5.5}{8.5-5.5}$$

$$\Rightarrow x = 1.83$$

$$\Rightarrow \frac{1.83}{10} (100)$$

4. Find the variance of the sample data -3, -2, 0, 2, 3 6.5

$$\frac{2(1) + 2(4)}{4} = 6.5$$

5. Suppose that  $P(A) = 0.6$ , and  $P(B) = 0.4$ , and  $P(A \cup B) = 0.8$ . Find  $P(A \cap \bar{B})$  0.4

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

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

$$= 0.6 + 0.4 - 0.8$$

$$= 0.2$$

$$\Rightarrow P(A \cap \bar{B}) = 0.6 - 0.2 = 0.4$$

$$\frac{18+6}{24} =$$

**Part B: Write down every step of your work. Each question is worth 4 marks.**

Q6) A sample data has mean  $\bar{X} = 30$  and standard deviation  $S_x = 12$ . Each observation  $X$  in this sample is multiplied by  $-2$  to produce a new sample. Find an interval that contains at least  $\frac{15}{16}$  of the observations in the new sample.

$$\begin{aligned} & (\bar{y} - kS_y, \bar{y} + kS_y) \\ & (-60 - 4(24), -60 + 4(24)) \\ & (-156, 36) \end{aligned}$$

$$\begin{aligned} k &= 4 \\ S_y &= 24 \\ \bar{y} &= -60 \end{aligned}$$

$$(-18, 78)$$

Q7) Let  $A, B$  be events. Suppose that  $P(A|B) = 0.2$ ,  $P(A \cup B) = 0.6$  and  $P(\bar{B}) = 0.5$ . Find  $P(A)$ .

$$P(A \cup B) = P(A) + 0.5 - 0.5(0.2)$$

$$0.6 = P(A) + 0.4$$

$$\boxed{P(A) = 0.2}$$

$$P(B) = +1$$

$$P(A \cap B) = +1$$

$$\underline{P(A) + 2}$$

Key 4



Name (in Arabic):

Number:

Instructor's name:

Class days and time:

**Part A: fill in the blanks with answers only. Each question is worth 2 marks.**

Q1) Consider the following grouped sample data of 10 observations:

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

a) the mean of this sample data equals.....6.....

b) if one observation is selected from this sample and found to be greater than or equal to 5, then the probability that it is in the 3<sup>rd</sup> class (8 to 10) equals..... $\frac{2}{6}$ .....

c) the proportion of observations that are less than or equal to 9 equals..... $\frac{9}{10}$ .....

Q2) Three numbers are randomly selected from the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 without replacement. The probability that two numbers of them are odd equals.....

Q3) A sample data contains 10 observations and has mean  $\bar{x} = 4$ . The observation 10 in the sample is changed to 5. The mean of the new sample equals.....3.5.....

$40 - 10 + 5$

Q4) Consider the following sample data of 24 observations

x	1	2	3	4	5	6	7	8
Frequency	5	5	5	3	2	2	1	1

The third quartile  $Q_3$  of this sample data equals.....4.5.....



$P(\text{odd-odd-even}) + P(\text{odd-even-odd}) + P(\text{even-odd-odd})$   
 $\frac{5}{9} \cdot \frac{4}{8} \cdot \frac{4}{7} + \frac{5}{9} \cdot \frac{4}{8} \cdot \frac{4}{7} + \frac{4}{9} \cdot \frac{5}{8} \cdot \frac{4}{7}$

$\frac{4 \cdot 5!}{2!} = \frac{4 \cdot 120}{2} = 240$   
 $\frac{240}{3 \cdot 2 \cdot 7} = \frac{20}{21}$

$\frac{4 \cdot 5!}{3! \cdot 2!} = \frac{4 \cdot 120}{6 \cdot 2} = \frac{40}{1} = 40$   
 $\frac{20}{42} = \frac{10}{21}$

$\frac{\binom{5}{2} \binom{4}{1}}{\binom{9}{3}} = \frac{10 \cdot 4}{84} = \frac{40}{84} = \frac{10}{21}$



Part B: Write down every step of your work. Each question is worth 4 marks.

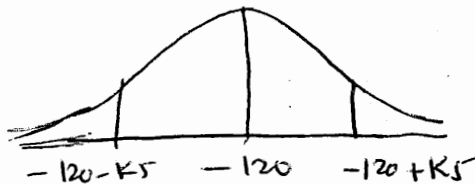
Q6) A sample data has mean  $\bar{X} = 30$  and standard deviation  $S_x = 6$ . Each observation  $X$  in this sample is multiplied by ~~4~~ to produce a new sample. Find an interval that contains at least  $\frac{15}{16}$  of the observations in the new sample.

$$\bar{X} = 30 \quad S_x = 6 \quad Y = -4X \Rightarrow$$

$$\bar{Y} = -120$$

$$S_y = 4(6) = 24$$

$$K = 4$$



$$\text{Lower} = -120 - 4(24) = -216$$

$$\text{Upper} = -120 + 4(24) = -24$$

(6, 94)

Q7) Let  $A, B$  be events. Suppose that  $P(A|B) = 0.2$ ,  $P(A \cup B) = 0.7$  and  $P(\bar{B}) = 0.7$ . Find  $P(A)$ .

$P(A)$

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

$$0.7 = P(A) + 0.3 - P(A|B)P(B)$$

$$0.4 = P(A) - 0.2(0.3)$$

$$0.4 + 0.06 = P(A)$$

$$\Rightarrow P(A) = 0.46$$

$$P(A \cap B) = 0.06$$



Name (in Arabic):

Number:

Instructor's name:

Class days and time:

**Part A: fill in the blanks with answers only. Each question is worth 2 marks.**

Q1) Consider the following grouped sample data of 10 observations:

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

a) the mean of this sample data equals.....  $6.9$  .....

b) if one observation is selected from this sample and found to be greater than or equal to 5, then the probability that it is in the 3<sup>rd</sup> class (8 to 10) equals.....  $2/7$  .....

c) the proportion of observations that are less than or equal to 9 equals.....  $7/10 = 0.7$  .....

Q2) Three numbers are randomly selected from the numbers 1,2,3,4,5,6,7,8 without replacement. The probability that two numbers of them are odd equals.....  $\frac{\binom{4}{2}\binom{4}{1}}{\binom{8}{3}} = \frac{4\binom{4}{2}}{\binom{8}{3}}$  .....

Q3) A sample data contains 10 observations and has mean  $\bar{X} = 6$ . The observation 10 in the sample is changed to 5. The mean of the new sample equals.....  $5.5$  .....

Q4) Consider the following sample data of 24 observations

x	1	2	3	4	5	6	7	8
Frequency	3	5	5	4	2	2	2	1

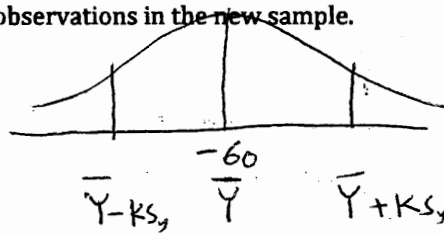
The third quartile  $Q_3$  of this sample data equals.....  $5$  .....

-1/2

Part B: Write down every step of your work. Each question is worth 4 marks.

Q6) A sample data has mean  $\bar{X} = 30$  and standard deviation  $S_X = 10$ . Each observation  $X$  in this sample is multiplied by  $-2$  to produce a new sample. Find an interval that contains at least  $\frac{15}{16}$  of the observations in the new sample.

$$\begin{aligned} Y &= -2X \\ \bar{Y} &= -60 \\ S_Y &= 20 \end{aligned}$$



$$\frac{15}{16} = 1 - \frac{1}{k^2} \Rightarrow k^2 = 16 \Rightarrow \boxed{k=4}$$

$$\text{Lower} = -60 - 4(20) = -140$$

$$\text{Upper} = -60 + 4(20) = 20$$

Q7) Let  $A, B$  be events. Suppose that  $P(A|B) = 0.2$ ,  $P(A \cup B) = 0.6$  and  $P(\bar{B}) = 0.6$ . Find  $P(A)$ .

$$\begin{aligned} P(A \cap B) &= P(A|B)P(B) \\ &= 0.2(0.4) \\ &= 0.08 \end{aligned} \quad (+1)$$

$$P(B) = 0.4 \quad (+1)$$

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

$$\begin{aligned} 0.6 &= P(A) + 0.4 - 0.08 \\ & \quad (+2) \end{aligned}$$

$$\boxed{P(A) = 0.28}$$

	B	$\bar{B}$
A	0.08	
$\bar{A}$	0.32	
	0.4	0.6

Key Form 2



Department of Mathematics

103131 First Test

Name (in Arabic):

Number:

Instructor's name:

Class days and time:

**Part A: fill in the blanks with answers only. Each question is worth 2 marks.**

Q1) Consider the following grouped sample data of 10 observations:

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

a) the mean of this sample data equals.....7.8.....

b) if one observation is selected from this sample and found to be greater than or equal to 5, then the probability that it is in the 3<sup>rd</sup> class (8 to 10) equals.....1/4.....

Bayes  
 $\frac{2}{8}$

c) the proportion of observations that are less than or equal to 9 equals..... $\frac{6}{10} = 0.6$ .....

Q2) Three numbers are randomly selected from the numbers 1,2,3,4,5,6,7 without replacement. The probability that two numbers of them are odd equals..... $\frac{(3)(2)(1)}{(7)(6)(5)}$ .....

$= \frac{18}{35} = 0.514$

Q3) A sample data contains 10 observations and has mean  $\bar{x} = 7$ . The observation 10 in the sample is changed to 5. The mean of the new sample equals.....6.5.....

Q4) Consider the following sample data of 24 observations

x	1	2	3	4	5	6	7	8
Frequency	2	5	5	3	3	2	2	2

The third quartile  $Q_3$  of this sample data equals.....5.5.....

$\frac{8}{70} = \frac{4}{35}$   
 $\frac{0.6}{14} \times 14$

4 odd  
3 even  
2 odd

$$\frac{4}{7} \cdot \frac{1}{6} \cdot \frac{3}{5} + \frac{4}{7} \cdot \frac{2}{6} \cdot \frac{3}{5} + \frac{3}{7} \cdot \frac{1}{6} \cdot \frac{2}{5}$$

$\frac{18}{35} = \frac{26}{247}$

00e  
0e0  
e04

**Part B: Write down every step of your work. Each question is worth 4 marks.**

Q6) A sample data has mean  $\bar{X} = 30$  and standard deviation  $S_x = 8$ . Each observation  $X$  in this sample is multiplied by  $-2$  to produce a new sample. Find an interval that contains at least  $\frac{15}{16}$  of the observations in the new sample.

$$\begin{aligned} & (\bar{y} - kS_y, \bar{y} + kS_y) \\ & (-60 - 4(16), -60 + 4(16)) \\ & (-124, 4) \end{aligned}$$

$$k = 4$$

$$\bar{y} = -60$$

$$S_y = 2(8) = 16$$

Based on  $x$   
(-2, 62)

Q7) Let  $A, B$  be events. Suppose that  $P(A|B) = 0.2$ ,  $P(A \cup B) = 0.6$  and  $P(\bar{B}) = 0.7$ . Find  $P(A)$ .

$$\begin{aligned} P(A \cup B) &= P(A) + P(B) - P(A|B)P(B) \\ &= P(A) + 0.3 - 0.2(0.3) \\ 0.6 &= P(A) + 0.24 \end{aligned}$$

$$P(A) = 0.36$$

Fall 2012-2013

Key 1



Department of Mathematics

103131 First Test

Name (in Arabic):

Number:

Instructor's name:

Class days and time:

Part A: fill in the blanks with answers only. Each question is worth 2 marks.

Q1) Consider the following grouped sample data of 10 observations:

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

a) the mean of this sample data equals..... 8.7 .....

b) if one observation is selected from this sample and found to be greater than or equal to 5, then the probability that it is in the 3<sup>rd</sup> class (8 to 10) equals.....  $\frac{2}{9} = 0.22$  .....

$$\frac{x-4}{6-4} = \frac{1.5}{3} \quad | \quad x-4 = \frac{2(\frac{1.5}{3})}{2} = 1$$

c) the proportion of observations that are less than or equal to 9 equals..... 5/10 .....

4.5	1
7.5	4
9	2
10.5	6
13.5	10

Q2) Three numbers are randomly selected from the numbers 1, 2, 3, 4, 5, 6 without replacement. The probability that two numbers of them are odd equals.....  $\frac{\binom{3}{2}\binom{3}{1}}{\binom{6}{3}} = \frac{3 \cdot 3}{20} = 0.45$  .....

Q3) A sample data contains 10 observations and has mean  $\bar{X} = 8$ . The observation 10 in the sample is changed to 5. The mean of the new sample equals..... 7.5 .....

$80 - 5$

Q4) Consider the following sample data of 24 observations

x	1	2	3	4	5	6	7	8
Frequency	1	5	5	3	2	3	2	3

The third quartile  $Q_3$  of this sample data equals..... 6 .....

Q3) ~~10~~  
 $n = 10$   
 $\bar{x} = 8$

~~10~~  $\rightarrow 5$  ✓

$$\bar{x} = \frac{\sum x}{n} \Rightarrow 8 = \frac{\sum x}{10} \Rightarrow \sum x = 80$$

$$\bar{x}_{new} = \frac{\sum x_{new}}{n} \Rightarrow \bar{x} = \frac{75}{10}$$

$$\sum x_{new} = 80 - 10 + 5$$

Q4)  $Q_3 = P_{75} = ?$

~~P~~  $L = nP$

$$L = (24) \left( \frac{75}{100} \right) = 18$$

X	f	cf
1	1	1
2	5	6
3	5	11
4	3	14
5	2	16
(6)	3	19
7	2	21
8	3	24
	24	

Q7)

سوال اولیٰ کے لیے

Q1)

classes	f	x (mid pt.)	xf	$\frac{xf}{N}$
2-4	1	3	3	0.1
5-7	3	6	18	0.3
→ 8-10	2	9	18	0.2
11-13	4	12	48	0.4
	10		87	

Q2)

1, 2, 3, 4, 5, 6

3 → odd  
3 → even

$$\binom{n}{r} = \frac{n!}{(n-r)! r!}$$

3!

PC odd,

$$\frac{\binom{3}{2} \binom{3}{1}}{\binom{6}{3}} = \frac{\frac{3!}{1!2!} \times \frac{3!}{2!1!}}{\frac{6!}{3!3!}}$$

$$= \frac{\frac{3! \times 3!}{2!2!}}{\frac{6!}{3!3!}} = \frac{3! \cdot 3! \cdot 3! \cdot 3!}{2!2!6!}$$





سورة الجمل آية ٥

~~27~~  
Q1)

<u>class</u>	<u>f</u>	<u>x</u>	<u>xf</u>	<u>rf</u>	<u>cf</u>
2-4	1	3	3	0.1	1
5-7	3	6	18	0.3	4
8-10	2	9	18	0.2	6
11-13	4	12	48	0.4	10
	10		87		

b)

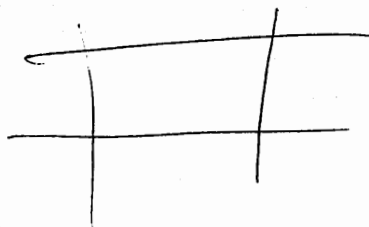
$$\bar{X} = \frac{\sum xf}{n}$$

$$P_{no \text{ of } < 5} = 0.1$$

$$P_{no \text{ of } \geq 5} = 0.9$$

$$P([3, 7] | [7, 5]) = \frac{P([3, 7] \cap [7, 5])}{P([7, 5])} = \frac{\frac{0.2}{1}}{\frac{0.9}{1}}$$

c)  $P(\leq 9)$



$$\frac{0.2 * 0.9}{0.9}$$

$$P(\geq 9) = 0.4$$

$$P(\leq 9) = 1 - 0.4 = 0.6$$

$$\begin{aligned}
 x_1 &= -2 & -2x_1 + -2x_2 + -2x_3 \\
 x_2 &= -2 \\
 x_3 &= -2
 \end{aligned}$$

Part B: Write down every step of your work. Each question is worth 4 marks.

Q6) A sample data has mean  $\bar{X} = 30$  and standard deviation  $S_x = 8$ . Each observation  $X$  in this sample is multiplied by  $-2$  to produce a new sample. Find an interval that contains at least  $\frac{15}{16}$  of the observations in the new sample.

$$\bar{X} = 30, \text{ sta}(X) = 8$$

$$\text{mean}(Y) = -2(\bar{X}) \Rightarrow \boxed{Y = -60}$$

$$\text{sta}(Y) = | -2 | \text{sta}(X) \Rightarrow \text{sta}(Y) = 16$$

$$\boxed{\text{Sta}(Y) = 16}$$

$$W = Y + kS$$

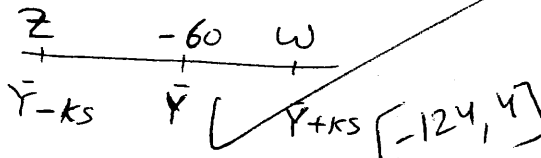
$$W = -60 + (4)(16)$$

$$W = 4$$

$$Z = \bar{Y} - kS$$

$$= -60 - (4)(16)$$

$$Z = -124$$



the Interval  $[4, -124]$

$$1 - \frac{1}{k^2} = \frac{15}{16}$$

$$1 - \frac{15}{16} = \frac{1}{k^2}$$

$$\frac{1}{16} = \frac{1}{k^2}$$

$$k^2 = 16$$

$$k = \pm 4$$

$$\Rightarrow \boxed{k = 4}$$
  

$$k > 0$$

Q7) Let  $A, B$  be events. Suppose that  $P(A|B) = 0.2$ ,  $P(A \cup B) = 0.6$  and  $P(B) = 0.7$ . Find  $P(A)$ .

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$P(B) = 0.7$$

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

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

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

$$P(A) + P(B) - P(A \cup B) = P(A|B) P(B)$$

$$P(A) + 0.7 - 0.6 = (0.2)(0.7)$$

$$P(A) - 0.3 = 0.06$$

$$P(A) = 0.06 + 0.3$$

$$P(A) = 0.36$$

classes	f	x (mid pt.)	xf
2-4	1	3	3
5-7	3	6	18
8-10	2	9	18
11-13	4	12	48
	10		87

THE UNIVERSITY OF JORDAN

Department of Mathematics

103131 First Test

Name (in Arabic): علاء خليل أبو عبد

Number: 66

Instructor's name: د. أحمد العلق

Class days and time: 9:30-11:00

Part A: fill in the blanks with answers only. Each question is worth 2 marks.

Q1) Consider the following grouped sample data of 10 observations:

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

- a) the mean of this sample data equals.....  $\bar{x} = \frac{\sum xf}{n} = \frac{87}{10} = 8.7$
- b) if one observation is selected from this sample and found to be greater than or equal to 5, then the probability that it is in the 3<sup>rd</sup> class (8 to 10) equals.....  $\frac{0.2}{0.9}$   
 Pro. less than 5 = 0.1, greater than or equal = 0.9
- c) the proportion of observations that are less than or equal to 9 equals..... 0.6

Q2) Three numbers are randomly selected from the numbers 1,2,3,4,5,6 without replacement. The probability that two numbers of them are odd equals.....  $\frac{\binom{3}{2} \binom{3}{1}}{\binom{6}{3}} = \frac{9}{20} = 0.45$

Q3) A sample data contains 10 observations and has mean  $\bar{X} = 8$ . The observation 10 in the sample is changed to 5. The mean of the new sample equals..... 7.5

$\sum x_{old} = 80$   
 $\sum x_{new} = 75$

Q4) Consider the following sample data of 24 observations

x	1	2	3	4	5	6	7	8
Frequency	1	5	5	3	2	3	2	3

The third quartile  $Q_3$  of this sample data equals.....

$Q_3 = P_{75} = ??$   
 $L = nP \Rightarrow L = (24) \left(\frac{75}{100}\right) = 18$   
 $Q_3 = P_{75} = \frac{\text{value}(L_{18}) + \text{value}(L_{19})}{2}$   
 $= \frac{6 + 6}{2} = 6$

(Q4) A bell shaped sample data has mean  $\bar{X} = 40$  and standard deviation  $S = 15$ . What is the percentage of observations in this sample data that are between 70 and 85.  
A)13.5%      B)15.5%      C)2%      D)2.5%

(Q5) 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 6 classes of equal width (length). Find the the width of each class.  
A)10      B)9      C)8      D)7

(Q6) Given the following information:

Box I: contains 2 Red and 4 Black balls.

Box II: contains 4 Red and 2 Black balls.

One box is chosen randomly with probability  $(1/2)$  and then one ball is drawn. Find

(a) P(drawn ball is red | Box I was chosen)  
A) $\frac{3}{4}$       B) $\frac{1}{2}$       C) $\frac{2}{3}$       D) $\frac{1}{3}$

(b) P(drawn ball is red)  
A) $\frac{1}{2}$       B) $\frac{1}{12}$       C) $\frac{5}{12}$       D) $\frac{7}{12}$

(c) P(Box I is drawn | ball drawn is red)  
A) $\frac{4}{7}$       B) $\frac{3}{5}$       C) $\frac{1}{3}$       D)1

Name	Student Number	Section	Serial number
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(Q1) Given the following table

Class	Frequency
3-5	2
6-8	2
9-11	1
12-14	5

(a) Find the mode

A) 13

B) 7

C) 4

D) 2

(b) Find the mean

A) 6.5

B) 6.7

C) 9.7

D) 7.6

(c) What is the percentage of observations that are greater than 5.5 and smaller than 11.5

A) 40%

B) 30%

C) 70%

D) 90%

Consider the following information about a sample

Median=2	Standard Deviation=3	First Quartile=1	Third Quartile=3
----------	----------------------	------------------	------------------

Assume that all values of  $X$  are transformed to  $Y = 4 - 2X$ , find(a) The standard deviation of  $Y$ 

A) 2

B) 4

C) 6

D) 3

(b) The first quartile of  $Y$ 

A) -10

B) -2

C) 0

D) -6

(Q3) Let  $A$  and  $B$  be two events in the same sample space such that  $P(A) = 0.2$ ,  $P(B) = 0.4$ ,  $A$  and  $B$  are independent. Find  $P(\bar{A} \cup \bar{B})$ ?

A) 0.92

B) 0.8

C) 1.0

D) 0.88

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

X	frequency
16	2
8	3
14	4
5	1

14

$$l = np = 10 \left( \frac{3}{4} \right) = 7.5 \uparrow$$

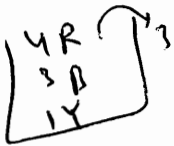
		cf
5	1	1
8	3	4
14	4	8
16	2	10

7. A box contains 4 red, 3 blue and 1 yellow balls. 3 balls are drawn, one at a time without replacement.

Find the probability of having a red then a blue then a red ball.

$\frac{3}{28} = 0.107$

$$P(RBR) = \frac{4}{8} \cdot \frac{3}{7} \cdot \frac{1}{6}$$



For questions 8-9. Consider a bell-shaped sample data. With mean 60 and standard deviation 14. Suppose that the sample data is coded to  $Y = 1 - 2x$

8. Find the mean  $\bar{Y}$

-119

$$\bar{Y} = 1 - 2\bar{x} = 1 - 2(60) = 1 - 120$$

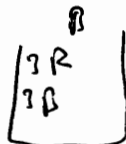
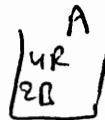
9. Find the 16th percentile of the coded data (i.e.  $P_{16}(Y)$ )

-147

$$P_{16}(Y) = 1 - 2P_{84}(x) = 1 - 2(74)$$

$$P_{84}(x) = \bar{x} + S = 60 + 14 = 74$$

10. Suppose we have two boxes, Box A contains 4 red and 2 black balls, while box B contains 3 red and 3 black balls. One box is selected and one ball is drawn at random from that box. If the probability of selecting box A is  $\frac{1}{6}$  and the probability of selecting box B is  $\frac{5}{6}$ . What is the probability that the drawn ball is red?



$\frac{19}{36} = 0.528$

$$P(A) = \frac{1}{6}$$

$$P(B) = \frac{5}{6}$$

$$P(R|A) = \frac{4}{6}$$

$$P(R|B) = \frac{3}{6}$$

$$\frac{1}{6} \left( \frac{4}{6} \right) + \frac{5}{6} \left( \frac{3}{6} \right)$$

$$\frac{4}{36} + \frac{15}{36}$$





Name \_\_\_\_\_ Student number \_\_\_\_\_ Section: \_\_\_\_\_ Serial number \_\_\_\_\_

Fill the rectangular box with the correct final answer.  
Answers without solution details are not accepted.

For questions 1-3. Consider the following table that represents a quiz results for 10 students

Class	frequency	x	xf
3-5	4	4	16
6-8	2	7	14
9-11	4	10	40
			<u>70</u>

1. Find the actual limits of the first class (2.5-5.5)

2. Find the mean of this sample 7

$$\frac{\sum x}{n} = \frac{70}{10}$$

	ef
5.5	45
→ 6	20
8.5	6
11.5	10

3. Find the percentage of observations that is less than 6 43.3%

$$\frac{x - 4}{6 - 4} = \frac{6 - 5.5}{8.5 - 5.5}$$

$$\frac{x - 4}{2} = \frac{0.5}{3}$$

4. Find the variance of the sample data -4, -2, 0, 2, 4 10

$$\frac{\sum x^2}{n-1}$$

5. Suppose that  $P(A) = 0.6$ , and  $P(B) = 0.4$ , and  $P(A \cup B) = 0.8$ . Find  $P(\bar{A} \cap B)$  0.2

$$P(A \cap B) = 0.6 + 0.4 - 0.8 = 0.2$$

$$P(\bar{A} \cap B) = P(B) - P(A \cap B) = 0.4 - 0.2 = 0.2$$



Form 2

First Exam

Math 131

7-11-2012

Name \_\_\_\_\_ Student number \_\_\_\_\_ Section: \_\_\_\_\_ Serial number \_\_\_\_\_

Fill the rectangular box with the correct final answer.  
Answers without solution details are not accepted.

For questions 1-3. Consider the following table that represents a quiz results for 10 students

Class	frequency	$\Sigma x$	$\Sigma x^2$
3-5	2	4	8
6-8	4	7	28
9-11	4	10	40
			76

1. Find the actual limits of the first class  $(2.5 - 5.5)$

2. Find the mean of this sample  $\frac{76}{10} = 7.6$

3. Find the percentage of observations that is less than 6  $26.67\%$

4. Find the variance of the sample data -5, -2, 0, 2, 5  $\frac{58}{4} = 14.5$

5. Suppose that  $P(A) = 0.7$ , and  $P(B) = 0.5$ , and  $P(A \cup B) = 0.8$ . Find  $P(A \cap \bar{B})$   $0.3$

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

$$P(A \cap B) = 0.7 + 0.5 - 0.8 = 0.4$$

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

$$= 0.7 - 0.4 = 0.3$$

	cf
5.5	2.5
8.5	6
11.5	10

$$\frac{x-2}{6-2} = \frac{6-5.5}{8.5-5.5}$$

$$\frac{x-2}{4} = \frac{0.5}{3}$$

$$x = 2.666$$

$$\frac{2.666(100)}{10}$$



Form 4

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

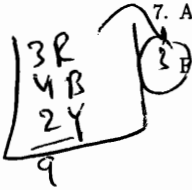
X	frequency
16	2
10	5
15	4
5	4

15

X	f	cf
5	4	4
10	5	9
15	4	13
16	2	15

$$l = n\frac{p}{4} = 15\left(\frac{3}{4}\right) = 11.25 \uparrow 12$$

7. A box contains 3 red, 4 blue and 2 yellow balls. 3 balls are drawn, one at a time without replacement.



Find the probability of having a red then a blue then a red ball.

$\frac{1}{21}$

$$= 0.0476$$

$$P(RBR) = \frac{3}{9} \cdot \frac{4}{8} \cdot \frac{2}{7}$$

For questions 8-9. Consider a bell-shaped sample data. With mean 30 and standard deviation 14. Suppose that the sample data is coded to  $Y = 1 - 2x$

8. Find the mean  $\bar{Y}$

-59

$$\bar{Y} = 1 - 2\bar{x} = 1 - 2(30) = 1 - 60$$

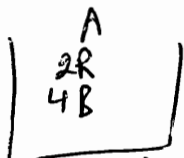
9. Find the 16th percentile of the coded data (i.e.  $P_{16}(Y)$ )

-87

$$P_{16}(Y) = 1 - 2P_{84}(X) = 1 - 2(44)$$

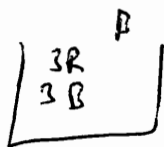
$$P_{84}(X) = \bar{x} + S = 30 + 14 = 44$$

10. Suppose we have two boxes, Box A contains 2 red and 4 black balls, while box B contains 3 red and 3 black balls. One box is selected and one ball is drawn at random from that box. If the probability of selecting box A is  $\frac{1}{6}$  and the probability of selecting box B is  $\frac{5}{6}$ . What is the probability that the drawn ball is red?



$$P(A) = \frac{1}{6}$$

$$P(R|A) = \frac{2}{6}$$



$$P(B) = \frac{5}{6}$$

$$P(R|B) = \frac{3}{6}$$

$\frac{17}{36} = 0.472$

$$\frac{1}{6}\left(\frac{2}{6}\right) + \frac{5}{6}\left(\frac{3}{6}\right)$$

$$\frac{2}{36} + \frac{15}{36} = \frac{17}{36}$$

