Q// 1) we measure the excess in weight (in kilogram) for a sample of pregnant women:

Classes	True classes	midpoint	Frequency	Relative frequency	Cumulative relative frequency
4 - 6			12		
7 - 9			15		
10 - 12			11		
13 - 15			8		
16 - 18			4		

Complete the table to answer the following questions:

1) 4^{th} true class is:

2) 3^{rd} midpoint is:

3) 2^{nd} relative frequency is:

4) 4^{th} cumulative relative frequency is:

5) How many women had excess in weight of 10 or more?

6) What percent of women had excess in weight from 4 to less than 12?

7) Which class of weight had the highest percentage of women?

Q# 2)We measure the number of asthma cases seen in the past months for a sample of hospital:

20 16 30 14 20 35 6 29 20 25 49 15

[1]The type of the variable is:
(a)qualitative (b) continuous (c) number (d) normal (e) discrete (f) statistic
[2]The sample mean is:
(a) 20 (b) 30 (c) 24 (d) 23.25 (e) 20.5 (f) 2.5
[3]The sample mode is:
(a) 16 (b) 49 (c) 35 (d)25 (e) 20 (f) no mode
[4]The sample median is:
(a) 16 (b) 25 (c) 20 (d) 35 (e) 30 (f) 49

[5]The sample standard deviation is:
(a) 10 (b) 23.25 (c) 128.93 (d) 7905 (e) 279 (f)11.355
[7]The coefficient of variation is:
(a) 204.76% (b) 48.84% (c) 554.53% (d) 100% (e) 84.82% (f) non of these
*If we multiply each number of asthma of stairs by 3, then:
[8] The sample mean is:
(a) 2 (b) the same (c) the mode (d) increased by 2 (e) divided by 2
(f) multiplied by 2
[9] The sample standard deviation is:
(a) the same (b) 2 (c) multiplied by 4
(d) increased by 2 (e) divided by 2 (f) multiplied by 2
[10] The coefficient of variation become:
(a) the same (b)more than 100% (c) smaller (d) larger (e) 0% (f) non of these

Q# 3)We measure the number of flights of stairs a person can walk up with out becoming very tired:

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

[1]The type of the variable is:
(a)qualitative (b) continuous (c) number (d) normal (e) discrete (f) statistic
[2]The sample mean is:
(a) 4 (b) 3 (c) 3.92 (d) 3.5 (e) 54 (f) 3.86
[3]The sample mode is:
(a) 4 (b) 3 (c) 7 (d)2,3,4,5 (e) 3.5 (f) no mode
[4]The sample median is:
(a) 4 (b) 2.5 (c) 3 (d) 3.5 (e) 7.5 (f) 3.33

[5]The sample variance is:
(a) 268 (b) 2.14 (c) 4.59 (d) 4.265 (e) 20.62 (f)2.066
[7]The coefficient of variation is:
(a) 180.18% (b) 1.87% (c) 21.78% (d) 53.5% (e) 55.5% (f) non of these
*If we multiply each number of flight of stairs by 2, then:
[8] The sample mean is:
(a) 3 (b) the same (c) decreased by 3 (d) increased by 3 (e) divided by 3
(f) multiplied by 3
[9] The sample variance is:
(a) the same (b) 9 (c) multiplied by 9
(d) increased by 3 (e) divided by 9 (f) multiplied by 3
[10] The coefficient of variation become:
(a) the same (b) 50% (c) smaller (d) larger (e) 0% (f) non of these

Q#4) If $S = \{1,2,3,4,5,6,7,8,9,10\}$ and
$A = \{1,3,5,7,9\}$
$B = \{1,2,4,5,6,8\}$
$C = \{6,7,8,10\}$

Find:

$P(A^c) =$

$P(A \cup B) =$

$P(B \cap C) =$

$P(A^c \cap B^c) =$

$P(B^c \cup C^c) =$

Q#5) A and B are events defined on the same sample space.

(a) If $P(\bar{A}) = 0.6, P(B) = 0.5$ and $P(A \cap B) = 0.1$,

Find:

(i) $P(A \cup B)$

(ii) $P(A \cap \bar{B})$

(iii) $P(\bar{A} \cap B)$

(iv) $P(\bar{A} \cap \bar{B})$

(b) If $P(A \cap \bar{B}) = 0.3, P(A \cap B) = 0.2$ and $P(\bar{A} \cap \bar{B}) = 0.1$,

Find: (i) $P(A)$

(ii) $P(\bar{A} \cap B)$

(iii) $P(A \cup B)$

Q# 6) Let A and B denote two events defined on the same sample space

(a) If P(A)= 0.6, P(B)=0.4 and $P(A \cup B) = 0.74$, determine whether A and B are independent.

(b) If A and B are independent and P(A)= 0.3, P(B)=0.1,

Find (i) $P(A \cup B)$, (ii) $P(A \cap \bar{B})$

(c) If A and B are independent and $P(A \cap \bar{B}) = \frac{1}{4}$, find P(B).

(d) If P(A)=0.5, P(B)=0.6 and $P(A \cup B) = 0.80$, determine whether A and B are independent.

Q#7) for any two events, A an B,

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

(a) $P(B^c)$ (b) $P(A \cup B)$ (c) $P(A^c \cap B)$ (d) $P(A - B)$ (e) none of these

2) If $P(A \cap B) = 0$, then we know that A and B are

(a) empty (b) disjoint (c)independent (d) events (e) none of these

Q# 8) For any two events, A and B:

[1] $P(A \cap B) =$

(a) $P(A)P(B)$ (b) $P(B)-P(B \cap A^c)$ (c) $P(A)+P(B)$

(d) $P(A)-P(B \cap A^c)$ (e) none of these

[2] $P(A \cup B) =$

(a) 1 (b) $1-P(A^c \cap B^c)$ (c) $P(A)+P(B)$

(d) $P(A)P(B)$ (e) none of these

[3] If A and B are independent, then P(B|A)=

(a) $P(B)$ (b) $P(B \cap A)$ (c) $P(A)$

(d) $P(B \cap A)/P(B)$ (e) none of these

Q# 9) if $\Omega = \{A,B,C,D\}$, and the outcomes are equally likely, then

[1] P(A)= (a) 1 (b) 1/2 (c) 1/4 (d) 1/3 (e) none of these

[2] 2P(D)= (a) $P(A)-P(B)$ (b) $P(A)/2$ (c) $P(C)$ (d) $P(A)+P(B)$ (e) none of these

Q# 10) The following table classifies 400 people according to their smoking habits and whether or not they have cancer

	Smoker (A)	Non-Smoker($\bar{A}$)
Has cancer (C)	200	50
Dose not have cancer($\bar{C}$)	50	100

If an individual is selected at random from this group, find the probability that he/she is

(a) a smoker and has cancer,

(b) a smoker or has cancer

(c) a non-smoker or has cancer

Q# 11) refer to the data in Q# 10,

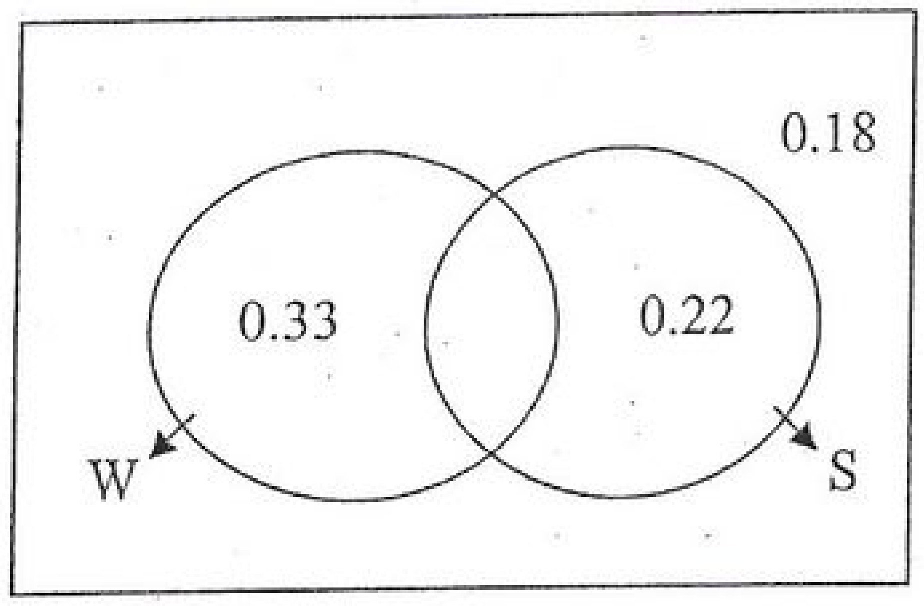
(a) If an individual is selected at random from the group, find the probability that the person selected:

(i) has cancer given that he/she is a smoker.

(ii) is not a smoker given that he/she dose not have cancer

(b) determine whether smoking and having cancer are independent

Q# 12) In a population of people with a certain disease , let W=is a woman and S = has a skin rash .
We have the following (incomplete) Venn diagram:



If we randomly chose one person , find the probabilities that the person choose:

[1] is a woman and doesn't have the skin rash
(a) 0.6 (b) 0.18 (c) 0.22 (d) 0.33 (e) 0.27

[2] has the skin rash
(a) 0.40 (b) 0.49 (c) 0.22 (d) 0.33 (e) 0.27

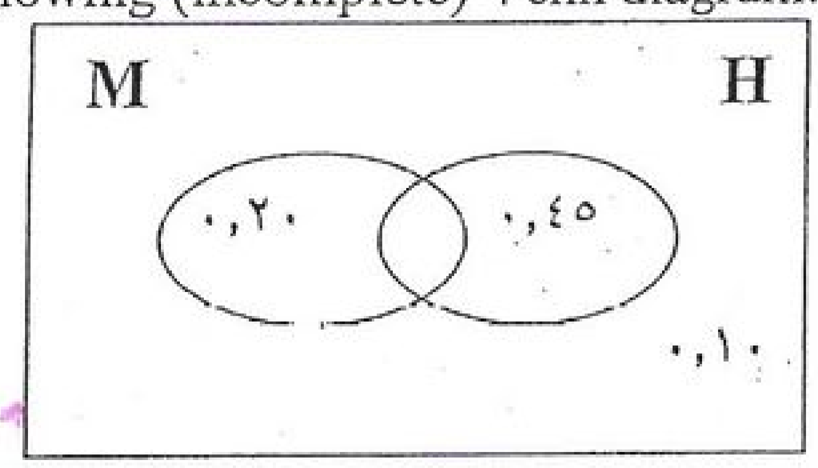
[3] is a man
(a) 0 (b) 0.40 (c) 0.22 (d) 0.49 (e) 0.27

[4] is a woman or has the skin rash
(a) 0.82 (b) 0.18 (c) 0.55 (d) 0.40 (e) 1

[5] has skin rash knowing that she is a woman
(a) 0.6 (b) 0.45 (c) 0.27 (d) 0.55 (e) 0.22

[6] is a woman or doesn't have the skin rash
(a) 0.4 (b) 0.18 (c) 0.22 (d) 0.73 (e) 0.51

Q# 13) In a population of adult patients with a certain disease, let M = "is a man" and H= "has a heart disease". We have the following (incomplete) Venn diagram:



If we randomly choose one patient, find the probabilities that the patient chosen:

[1] is a man and had a heart disease:
(a) 0.75 (b) 0.20 (c) 0.25 (d) 0.45 (e) 0.10

[2] is a women : (a) 0.55 (b) 0.70 (c) 0.45 (d) 0.10 (e) 0.80

[3] does not have a heart disease : (a) 0.55 (b) 0.10 (c) 0.65 (d) 0.30 (e) 0.70

[4] is a man or has a heart disease : (a) 0.45 (b) 0.70 (c) 0.55 (d) 0.25 (e) 0.90

[5] she has heart disease : (a) 0.45 (b) 0.55 (c) 0.6429 (d) 0.8182 (e) 0.70

[6] if we know that the patient has heart disease , what effect does this have on the probability that he is a man ?
(a) decreases (b) increases (c) has no effect
(d) it is the probability of a man (e) person has heart disease

Q#14) A population of student in faculty of science is classified according to their department and hobbies:

The Department / The hobbies	Chemistry (C)	Physics (P)	Biology (B)	Math (M)	Total
Reading(R)	23	14	35	19	91
Drawing(D)	14	9	28	9	60
Sewing(S)	8	11	23	7	49
Total	45	34	86	35	200

If one of these students is randomly chosen, then:

[1] Give in symbols the event "has the hobby of sewing and is not in the Biology department":

(a) $S \cap B$ (b) $S \cap B^c$ (c) $S \cup B^c$ (d) $S \cup B$ (e) none of these

[2] $P(D \cap M) =$ (a) 0.045 (b) 0.09 (c) 0.43 (d) 0.015 (e) 0.955

[3] $P(R \cup B) =$ (a) 0.177 (b) 0.175 (c) 0.885 (d) 0.71 (e) 0.455

[4] $P(R^c) =$ (a) 0.455 (b) 0.545 (c) 0.36 (d) 0.109 (e) 0

[5] $P(S^c \cap P^c) =$ (a) 0.128 (b) 0.755 (c) 0.83 (d) 0.945 (e) 0.64

[6] $P(B \mid C) =$ (a) 0.5111 (b) 0.115 (c) 0.225 (d) 0.11 (e) 0.4889

Q#15) A group of people in an urban area with a certain disease classified by the income level and main source of their drinking water:

Income Level / Source	Low (L)	Middle (M)	High (H)	Total
Bottled water (B)	15	160	55	230
Well water (W)	15	10	5	30
Dam water (D)	50	25	15	90
Total	**80**	**195**	**75**	**350**

If one of these people is randomly chosen give :

[1] In symbols, the event "had a low income and the source of water is not well water"

(a) $L \cup W^c$ (b) $L \cap W^c$ (c) $L^c \cup W^c$ (d) $L^c \cap W^c$ (e) non of these

[2] $P(L \cup W)$ = (a) 0.2286 (b) 0.0857 (c) 0.2714 (d) 0.7286 (e) 0.0429

[3] $P(D \cup M)$ = (a) 0.0714 (b) 0.2571 (c) 0.5571 (d) 0.4729 (e) 0.4429

[4] $P(W^c)$ = (a) 0.0857 (b) 0.9143 (c) 0.7429 (d) 0.3429 (e) 0.0429

[5] $P(D^c \cup M^c)$ = (a) 00714 (b) 0.4429 (c) 0.2571 (d) 0.4729 (e) 0.5571

[6] $P(d \cup D^c)$ = (a) 0.0429 (b) 0.2571 (c) 0.1857 (d) 0.8286 (e) 0.2143

[7] $P(M \mid D)$ = (a) 0.2778 (b) 0.3333 (c) 0.5571 (d) 0.4360 (e) 0.1154

[8] Knowing that the source of drinking water is Dam, choose the appropriate conditional probabilities to compare between the different income levels:

(a) P(D|L), P(D|M), P(D|H) (b) P(L) , P(M) , P(H)

(c) P(L | D) , P(M | D) (d) P(L | D) , P(M | D) , P(H | D)

(e) P(D) , P(L | D) , P(M | D)

Q#16) Suppose a population of women is classified by having headaches complain (H) and frequency of eating breakfast as:

Eat breakfast

	Never(N)	Sometime(S)	Always(A)	Total
H	15	85	20	120
H^c	10	90	30	130
Total	25	175	50	250

If one is randomly chosen from the population:

[1] In symbols, the event dose not always eat breakfast or dose not have headaches is
(a) $N \cap H^c$ (b) $N \cup H^c$ (c) $A^c \cap H^c$ (d) $A^c \cup H^c$

[2] In words, $H^c \cap S$ is
(a) complement of H intersect sometimes eats breakfast.
(b) A person has headaches complain and sometimes eats breakfast.
(c) A person dose not have headaches complain and sometimes eats breakfast
(d) A person dose not have headaches complain or sometimes eats breakfast

[3] $n(H \cup S) =$

[4] $n(H \cap S) =$

[5] $P(A \cap H^c) =$

[6] $P[(N \cup S) \cap H] =$

[7] $P(N \mid H) =$

[8] To find the frequency of eating breakfast with the highest probability given that the woman with headaches complain, we need to compare the conditional probabilities:
(a) $P(N \mid H), P(H \mid S)$, and $P(A \mid H)$
(b) $P(N \mid H), P(S \mid H)$, and $P(A \mid H)$
(c) $P(N \cap H), P(S \cap H)$, and $P(N \cap H)$

[9] Knowing the woman never eat her breakfast, what the probability that she dose not have headaches complain?

Q# 17) A population of people is classified by the calcium intake and whether the person is a man, woman, or child:

Calcium Intake

	Below needed(B)	Enough(E)	Above needed(A)	Total
Man (M)	72	200	48	320
Woman(W)	104	160	16	280
Child(C)	64	106	30	200
Total	240	466	94	800

If one person is randomly chosen from the population,

[1] Give the event $B^c \cap C$ in words.

[2] Give the event "above needed calcium given a woman" in symbols.

[3] $P(B) =$	(a) 0.09	(b) 0.15	(c) 0.3	(d) 0.7	(e) 240
[4] $P(W^c) =$	(a) 0.13	(b) 0.35	(c) 0.4	(d) 0.65	(e) 0.87
[5] $P(W \cup B) =$	(a) 0	(b) 0.13	(c) 0.52	(d) 0.65	(e) 0.73
[6] $P(M \cap C) =$	(a) 0	(b) 0.13	(c) 0.35	(d) 0.65	(e) 0.69
[7] $P(W \cap B^c) =$	(a) 0.18	(b) 0.22	(c) 0.54	(d) 0.83	(e) 1.05
[8] $P(A \cup E) =$	(a) 0	(b) 0.31	(c) 0.39	(d) 0.7	(e) 0.83
[9] $P(B \mid C) =$	(a) 0.08	(b) 0.267	(c) 0.32	(d) 0.47	(e) 0.55

[10] Knowing the person is a woman has what effect on the probability of having a calcium intake that is below needed?

The appropriate probabilities to compare are: **(You do not need to calculate any values)**

(a) $P(W)$ and $P(W \mid B)$ (b) $P(B)$ and $P(B \mid W)$ (c) $P(W)$ and $P(B \mid W)$

(d) $P(B)$ and $P(W \mid B)$ (e) $P(B \mid W)$ and $P(B \mid W^c)$

[11] Is the probability of an above needed calcium intake smaller given that a man or given that a woman?

The appropriate probabilities to compare are: **(You do not need to calculate any values)**

(a) $P(M \mid W)$ and $P(W \mid A)$ (b) $P(A \mid M)$ and $P(A \mid W)$ (c) $P(A)$ and $P(A \mid M)$

(d) $P(A)$ and $P(A \mid M \cup W)$ (e) $P(A \mid M)$ and $P(A \mid M^c)$

Q#18)For a population of adults, X = the number of filled teeth a person has. We randomly choose one and the cumulative distributed is given below:

X	$P(X \leq x)$
1	٠,٢٥
٣	٠,٣٣
٥	٠,٤٩
٦	٠,٧٨
٨	١

(6) P(X =٣) = (a) 0.25 (b) 0.33 (c) 0.08 (d) 0.58 (e) 0.67
(7) P(X =7) = (a) 0.78 (b) 0.22 (c) 0.11 (d) 1 (e) 0
(8) $P(3 \leq X \leq 6)$ = (a) 0.53 (b) 0.47 (c) 0.24 (d) 0.43 (e) 0.78
(9) The expected number of filled teeth a person has from this population: (a) 16.37 (b) 4.79 (c)0 .23 (d) 0.6135 (e) we can't find it

Q#)For a probability of children, X= the number of sweet eaten on a certain day. We randomly chose a child and the number of sweets he ate was from 0 to 4 sweets. The following probabilities are given:
P(X=0) = 0.08, P(X=2) =0.31, P(X>2) = 0.42, $P(1<X \leq 3)$ =0.63.
Then,
[1] P(X=1) = (a) 0.09 (b) 0.23 (c) 0.42 (d) 0.19 (e) 0
[2] P(X=3) = (a) 0.68 (b) 0.22 (c) 0.32 (d) 0.51 (e) 0
[3] $P(X \leq 2)$ = (a) 0.92 (b) 0.58 (c) 0.99 (d) 0.27 (e) 1
[4] The expected number of sweets eaten daily by a child from this population is:
(a) 1 (b) 2 (c) 0.217 (d) 4.7089 (e) 2.17

Q#19) If X is a discrete random variable with probability distribution:

X	0	1	2	3	4	5
P(X=x)	0.05	0.15	0.15	0.25	0.3	0.1

1) What value of X has the highest probability? (a) 1 (b) 2 (c) 3 (d) 4 (e) 5
2) P(X<3) = (a) 0.25 (b) 0.35 (c) 0.4 (d) 0.6 (e) 0.65
3) $P(1 \leq X<4)$ = (a) 0.1 (b) 0.15 (c) 0.3 (d) 0.55 (e) 0.85
4) μ= (a) 2.5 (b) 2.9 (c) 3.0 (d) 3.5 (e) 11.3

Q#20)For a child, the variable X= the number of times he eat in a certain day, Where $0 \leq X \leq 4$. The following probabilities are given:
P(X=3) = 0.15, P(X=2) =0.2, $P(X \geq 3)$ = 0.35, $P(0<X \leq 2)$ =0.55.
Then,
1] P(X=4) = (a) 0.1 (b) 0.3 (c) 0.15 (d) 0.2 (e) 0
2] P(X=0) = (a) 0.25 (b) 0.3 (c) 0.1 (d) 0.5 (e) 0
4] The expected number of candy he ate in a day:
(a) 1 (b) 4 (c) 0 (d) 0.5 (e) 2

Q#21) For a population of families, x = the number of children in primary school. We randomly choose one and the cumulative distributed is given below:

X	$P(X \leq x)$
0	٠,١٢
١	٠,٣٦
٢	٠,٧٢
٣	٠,٩٥
٥	١

(1) P(X = 2) = (a) 0.24 (b) 0.36 (c) 0.48 (d) 0.64 (e) 0.72
(2) P(X = 3) = (a) 0.23 (b) 0.36 (c) 0.47 (d) 0.59 (e) 0.95
(3) $P(1<X \leq 4)$ = (a) 0 (b) 0.36 (c) 1.08 (d) 0.59 (e) 0.72
(4) The expected number of children in primary school for a family from this population:
(5) (a) 1.9 (b) 1.09 (c)0 .19 (d) 9.65 (e) we can't find it

Q# 22) For a certain clinic, X = the number of births with complications in 28 days has a Poisson(4.2) distribution.

[1] The formula for P(X = 5) is:

(a) $\binom{5}{1}(0.42)^1(0.58)^4$ (b) $e^{-4.2}(4.2)^5/5!$ (c) $\binom{30}{5}(0.42)^5(0.58)^{25}$

(d) $e^{-5}(4.2)^5/5!$ (e) $e^{-4.2}(5)^{4.2}/5!$

[2] $P(X > 0) =$

(a) 0.015 (b) 0.1499 (c) 0.07798 (d) 0.985 (e) none of these

[3] Let Y = the number of births with complications in a week. Then P(Y = 1)=

(a) 1.05 (b) 0.3499 (c) 0.3674 (d) 0.0629 (e) none of these

Q# 23) in large population of student, 16% are left-handed. If we randomly choose 10 student and let x= the number of these 10 students who are left-handed, then

1- The probability distribution of x is $P(X = x) =$

(a) $C_x^{10}(0.84)^x(0.16)^{10-x}$ (b) $C_x^{10}(0.16)^x(0.84)^{10-x}$

(c) $C_x^{16}(0.10)^x(0.90)^{16-x}$ (d) $e^{-16}(16)^x/x!$

2- the values that x takes are:

(a)1,2,…,10 (b) 1,2,…,16 (c) 0,1,2,…,10

(d) 0,1,2,…,16 (e) 0,1,2,…,∞

3- $P(X = 3) =$

(a) 0.142 (b) 0.00019 (c)0.000078 (d) 0.14504

4- the expected value of x =

(a)1.6 (b) 84 (c) 10 (d) 14.4 (e) none of these

Q# 24) If Z is N(0,1), find

(a) $P(Z \leq 1.36)$

(b) $P(Z \geq 2.4)$

(c) $P(Z < 1.81)$

(d) $P(Z > 2.7)$

(e) $P(-1.2 < Z < 2.1)$

(f) $P(Z = 1.4)$

(g) $P(-2.36 < Z < 1.45)$

Q# 25) In population of Saudi women aged 11- 20, X = the serum cholesterol level (in mmol/l) is normally distributed with $\mu = 4.4$ and $\sigma = 0.6$. for a randomly chosen person,

[1] P(X< 5.3) =

(a) 0.0668 (b) 0.1230 (c) 0.3770 (d) 0.8770 (e) 0.9332

[2] $P(4.5 \leq X \leq 4.7) =$

(a) 0.1240 (b) 0.2236 (c) 0.3707 (d) 0.5557 (e) 0.6293

[3] The value of x such P(X > x) = 0.1587 is:

(a) 1.0 (b) 3.8 (c) 4.8 (d) 5.0 (e) 5.6

Q//26) In a certain population of males, X = the haemoglobin level (in g/dl) is normally distributed with $\mu = 13$ and $\sigma^2 = 0.16$. For a randomly chosen victim,

[1] $P(X \leq 12) =$

(a) 0.0062 (b) 0.0571 (c) 0.5 (d) 0.9429 (e) 0.9938

[2] $P(13 \leq X \leq 14) =$

(a) 0.4332 (b) 0.4429 (c) 0.4938 (d) 0.9332 (e) 0.9938

[3] The value of x such $P(X > x) = 0.9015$ is:

(a) 12.08 (b) 12.48 (c) 13.36 (d) 13.52 (e) 13.82

Q//27) In a population of heat stroke victims, X = the cooling time (in min.) is normally distributed with $\mu = 40$ and $\sigma^2 = 100$. For a randomly chosen victim,

[1] $P(X \leq 25) =$

(a) 0.0062 (b) 0.0668 (c) 0.4404 (d) 0.5596 (e) 0.9332

[2] $P(20 \leq X \leq 70) =$

(a) 0.1587 (b) 0.8413 (c) 0.9544 (d) 0.9759 (e) 1.0215

[3] The value of x such $P(X > x) = 0.791$ is:

(a) 0.81 (b) 18.4 (c) 31.9 (d) 47.9 (e) 48.1

Q//28) In population of people, X = the body mass index (in kg/m^2) is normally distributed with mean $\mu = 25$ and standard deviation $\sigma = 2$. For a randomly chosen person,

[1] $P(X < 21) =$

(a) 0.9772 (b) 0.4772 (c) 0.9821 (d) 0.0228 (e) none of these

[2] $P(19 < X < 28) =$

(a) 0.9332 (b) 0.9319 (c) 0.9345 (d) 0.5332 (e) none of these

[3] The value of x such $P(X > x) = 0.2578$ is:

(a) 0.65 (b) 1.3 (c) 26.3 (d) 23.7 (e) none of these