

Answer the following questions:-

الامتحان ٧ اسئلة (يتم اجابة السؤال السابع في ورقة الأسئلة الخاصة به ثم تسلّم مع ورقة الإجابة)

Q#1

(12 marks)

Students from 3rd year were asked to record their heights in inches. The heights were recorded as follows:

65 52 54 72 63 75 65 61 67 64 74 62
60 69 66 55 67 80 73 74 64 71 50 65

- Create relative frequency distribution. Make your class width equal 6 and start the first class with 50
- Draw the relative histogram.
- What is the shape of the histogram? ("Approximately" normal, skewed right, skewed left?)
- Using the relative frequency histogram, what is the probability of a randomly select student having a height between 65 and 79?
- Find the median and mode of the data.

Q#2

(12 marks)

Compare the strength (N) of the two materials shown below applying measures of both central tendency and variability

Material A	20.8	19.6	20.2	19.8	16.9	18.7	22.2	20.4	21.7	19.0
Material B	22.9	18.1	20.8	23.1	20.5	21.1	19.4	15.0	21.0	17.4

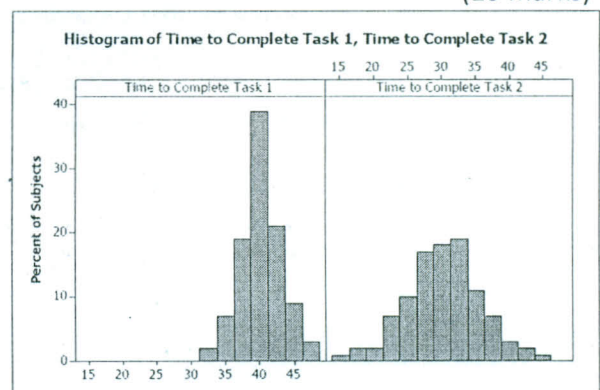
If target strength is 20 N, which material would you use. Why?

Q#3

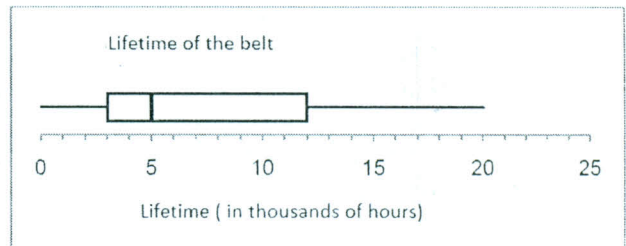
(10 marks)

a) The given histograms are the distributions of the times to complete two tasks, Task1 and Task 2. Notice that the histograms are graphed using the same horizontal and vertical scales. Please answer the following:

- Which task has a shorter mean completion time? What is that mean time, approximately (i.e. estimate the mean time from the histogram)?
- Which task has the smaller standard deviation? Why?



b) The shown boxplot shows the lifetime of a power transmission belt in a ring spinning machine (measured in thousands of hours). Use the boxplot to answer the following questions:



- I. What are the median (50th percentile), the 75th percentile, IQR and the range for the lifetime of the belt.
- II. Based on the box plot, do you think the mean lifetime of the belt is larger or smaller than the median lifetime? Why?

Q#4

(10 marks)

a) In the manufacture of commercial carpet, small faults occur at random in the carpet at an average of 0.95 per 20 m^2 . Find the probability that in randomly selected 20 m^2 area of this carpet

- i. There is no faults
- ii. there at most 2 faults

b) If X is binomially distributed with 6 trials and a probability of success equal to $\frac{1}{4}$ at each attempt, what is the probability of : i) Exactly 4 success ii) at least one success

Q#5

(12 marks)

- a. The distribution of scores on a University entrance exam can be modeled with a normal distribution with mean 68 and standard deviation 9.
 - i. What is the probability of students who take this exam have a score less than 65
 - ii. What exam score corresponds to a z-score of -2.3?
 - iii. Suppose the university gives scholarships to those who score in the top 7%. What scores constitute this range?
- b. An unknown distribution has a mean of 90 and a standard deviation of 15. Samples of size $n = 36$ are drawn randomly from the population. Find the probability that the sample mean is between 80 and 95
- c. The time it takes a technician to fix a computer is exponentially distributed with a mean of 10 minutes. What is the probability that it will take the technician less than 8 minutes to fix a randomly selected computer?

Q#6

(10 marks)

The number of workers on a job and the number of units produced for a shift are listed in the shown table. Let the number of units produced be the dependent variable.

- a. Draw scatter plot for the data
- b. Determine the regression equation and draw it on your scatter diagram.
- c. Predict the number of units with 10 workers.
- d. Calculate the coefficient of correlation

workers	units
9	12
3	14
5	9
7	14
12	17
6	13
13	17
4	9

Q#7

(4 marks)

a) Suppose a population has a uniform probability distribution. Now, suppose samples of size 36 were taken from this population. The sampling distribution of the samples of size 36

Will not be normal

Will be distributed uniformly

Cannot be determined

Approximates a normal curve

b) A _____ describes the number of occurrences of an event over a specified interval of time or space.

Binomial random variable

Discrete random variable

Poisson random variable

Continuous random variable

c) In a data set, if two variables x and y have a strong negative correlation, then a scatterplot of their values would fit loosely around

a straight line going down to the right

a horizontal line

a straight line going up to the right

a circle

d) What kind of distribution are the binomial and Poisson distributions?

Discrete

Both discrete and continuous

Continuous

Neither discrete or continuous

e) Consider a discrete random variable X that can assume the values 0, 1, and 2 with probabilities 0.2, 0.5, and 0.3, respectively. What is the expected value of X ?

1.1

1

0.9

1.3

f) If X is a binomial random variable with n trials and probability of success p , what is the mean of X ?

p

np

$\sqrt{np(1-p)}$

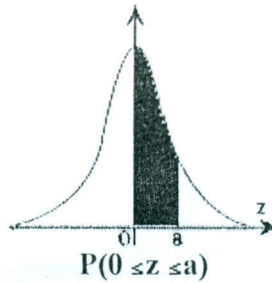
$np(1-p)$

g) Suppose that X is a random variable that can assume the values 1, 2, and 3. If $P(X = 1) = 0.1$ and $P(X = 2) = 0.2$, what is $P(X = 3)$?

- 0.3
- 0.5
- 0.7
- 0.9

h) If $X \sim U(11, 16)$, what is the standard deviation of X ?

- 1.73
- 1.15
- 1.44
- 2.02
- 0.87



a	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990