

# Assignment 2

Submitted assignment

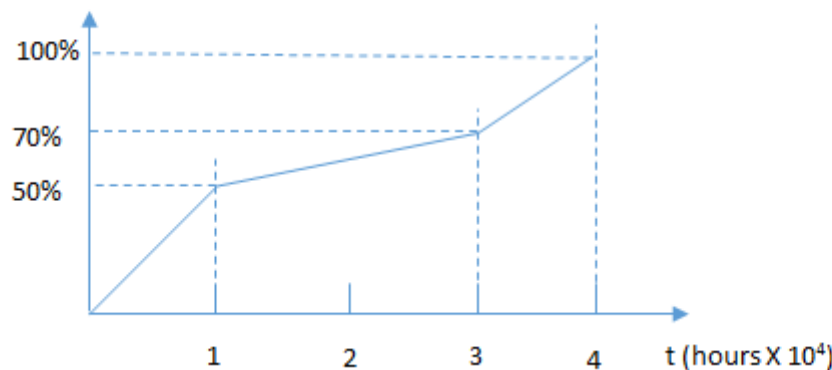
Due on 2015-08-02, 23:55 IST

1)

1 point

Question 1 through 4 pertain to the following description:

The time to failure (a leak) of an air conditioner is thought to be described by a continuous random variable. The graph below represents the cumulative density function (CDF) of this variable (Assume all lines are straight):



1) What is the probability that an air conditioner will fail before  $2 \times 10^4$  hours?

- ☐ 50%
- ☐ 70%
- ☒ 60%
- ☐ Cannot be determined from the graph

2) What is the probability that an air conditioner will last for exactly  $2 \times 10^4$  hours?

**1 point**

- ☒ 0%
- ☐ 20%
- ☐ 60%
- ☐ Cannot be determined from the graph

3) If we had a 1000 air conditioners, how many would we on average expect to still work after  $2 \times 10^4$  hours?

**1 point**

- ☐ 100
- ☐ 500
- ☐ 0
- ☒ 400

4) Which are the riskiest hours, or in other words where is the PDF of this distribution the highest (all hours are to be multiplied by  $10^4$ )?

**1 point**

- ☒ 0 to 1
- ☐ 1 to 2
- ☐ 1 to 3
- ☐ 3 to 4

5) Central Limit Theorem states that:

**1 point**

- ☐ When two variables are highly correlated the difference in those variables will converge to a fixed value
- ☐ A particular trend might appear between two variables when it is broken down across a third categorical variable (which does not exist without the third variable categorization)

☐ When an experiment is performed a large number of times, the average of the results should be close to the expected value. In other words as the number of trials tends to infinity, the average tends to the expected value.

☒ The aggregation of sufficient number of independent random variables results in a random variable which will be approximately normal.

6) For this distribution  $N(0, 5^2)$ , what is the distribution of sample mean, given a sample of size 'n'?

1 point

(a) Unknown distribution with mean 0 and variance  $\frac{5^2}{n}$

(b)  $N(5.n, \frac{5^2}{n})$

(c)  $N(0, 5^2)$

(d)  $N(0, (\frac{5}{\sqrt{n}})^2)$

☐ (a)

☐ (b)

☐ (c)

☒ (d)

7) If the null hypothesis of a statistical test is that  $\mu \leq 10$ , then the alternate hypothesis would be

1 point

☐  $\mu \neq 10$

☐  $\mu < 10$

☒  $\mu > 10$

☐  $\mu = 10$

8) The HR department in a company believes that employees of a specific designation should be compensated more or less equally. They are of the belief that the variance in the compensation of all associate managers should not be more than ₹ 22,000. However, they do not have the compensation information for all the associate managers in the company. They commission a survey and receive data on compensation for 16 associate managers. Which hypothesis test would you use to see if the variance in compensation is less than ₹22,000?

1 point

☐ Single sample z-test

- ☐ Single sample t-test
- ☒ Chi-Square test
- ☐ Single sample proportion z-test

9) Question 9 through 11 pertains to the following description.

**1 point**

A teacher typically grades her class with 30% As, 40% Bs, 20% Cs, 6% Ds and 4% Fs.

9) What is the probability of getting a B or better for a randomly selected student?

- ☐ 40%
- ☐ 30%
- ☒ 70%
- ☐ 100%

10) In a class of 10 students what is the probability that more than 2 students get grades D or worse (D or F) (approximately)?

**1 point**

- ☐ 1%
- ☐ 15%
- ☐ 93%
- ☒ 7%

11) In a class of 50,000 students what is the probability that more than 5050 students get grades D or worse (D or F)? (approximately)(Hint: Use the Normal approximation to the Binomial and you might have to use a z table or a software like Microsoft Excel to get the z score)

**1 point**

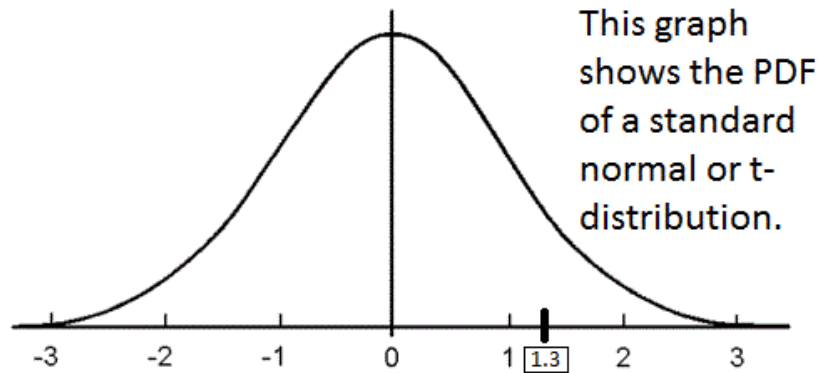
- ☒ 23%
- ☐ 77%
- ☐ 94%
- ☐ 6%

12) You decide to test the hypothesis that the average time for a technician to complete a certain task is 15 minutes. You do not know the population standard deviation. You have collected 14 data points in this regard (sample). What test would you use:

**1 point**

- ☐ Single sample z-test
- ☒ Single sample t-test
- ☐ Chi-Square test
- ☐ Proportion z-test

13) In the example from Question 12,. You calculate the test statistic for the appropriate test and find the value to be equal to 1.3. In order to get the p-value, Which one of the following would you calculate? **2 points**



- ☐ The probability of getting a value less than 1.3 in a Normal distribution with Mean = 0 and standard deviation = 1.
- ☐ The probability of getting a value less than 1.3 in a t-distribution with 14 degrees of freedom.
- ☐ The probability of getting a value greater than 1.3 in a t-distribution with 14 degrees of freedom.
- ☐ Two times the probability of getting a value less than 1.3 in a Normal distribution with Mean = 0 and standard deviation = 1.
- ☒ Two times the probability of getting a value less than 1.3 in a t-distribution with 13 degrees of freedom
- ☐ Two times the probability of getting a value equal to 1.3 in a t-distribution with 13 degrees of freedom
- ☐ Two times the probability of getting a value greater than 1.3 in a t-distribution with 13 degrees of freedom
- ☐ Two times the probability of getting a value greater than 1.3 in a t-distribution with 14 degrees of freedom