**Problem 1**

Cold Storage started its operations in Jan 2016. They are in the business of storing Pasteurized Fresh Whole or Skimmed Milk, Sweet Cream, Flavoured Milk Drinks. To ensure that there is no change of texture, body appearance, separation of fats the optimal temperature to be maintained is between 2 - 4 C.

In the first year of business, they outsourced the plant maintenance work to a professional company with stiff penalty clauses. It was agreed that if it was statistically proven that probability of temperature going outside the 2 - 4 C during the one-year contract was above 2.5% and less than 5% then the penalty would be 10% of AMC (annual maintenance case). In case it exceeded 5% then the penalty would be 25% of the AMC fee. The average temperature data at date level is given in the file “[Cold\_Storage\_Temp\_Data.csvView in a new window](https://olympus.greatlearning.in/courses/6112/files/389258/download?wrap=1)”

1. Find mean cold storage temperature for Summer, Winter and Rainy Season

Sol. 1. 

Output: 

1. Find overall mean for the full year.

Sol 2. 

Output: 

1. Find Standard Deviation for the full year

Sol 3. 

Output: 

1. Assume Normal distribution, what is the probability of temperature having fallen below 2 C?

Sol 4. 

OutPut: 

1. Assume Normal distribution, what is the probability of temperature having gone above 4 C?

Sol 5. 

Output: 

1. What will be the penalty for the AMC Company?

Sol 6. 

Output: 

Reasoning: **As the probability of temperature range from the dataset getting below 2 and above 4 C is 3.181981 % i.e in between 2.5% and 5 % . So penalty will be 10 % of AMC.**

**Problem 2**

In Mar 2018, Cold Storage started getting complaints from their Clients that they have been getting complaints from end consumers of the dairy products going sour and often smelling. On getting these complaints, the supervisor pulls out data of last 35 days’ temperatures. As a safety measure, the Supervisor decides to be vigilant to maintain the temperature 3.9 C or below.

Assume 3.9 C as upper acceptable value for mean temperature and at alpha = 0.1 do you feel that there is need for some corrective action in the Cold Storage Plant or is it that the problem is from procurement side from where Cold Storage is getting the Dairy Products. The data of the last 35 days is in “[Cold\_Storage\_Mar2018.csvView in a new window](https://olympus.greatlearning.in/courses/6112/files/389257/download?wrap=1)”

1. Which Hypothesis test shall be performed to check the if corrective action is needed at the cold storage plant? Justify your answer.

Sol 1. As the population mean and Standard deviation is not known we will use t-test

1. State the Hypothesis, perform hypothesis test and determine p-value

Sol 2.

Mean sample = 3.974286

SD sample = 0.159674

Sample mean = 3.9

Alpha= 0.1

Degree of Freedom = n-1 = 34

H1 : u <3.9

H0 ; u>=3.9

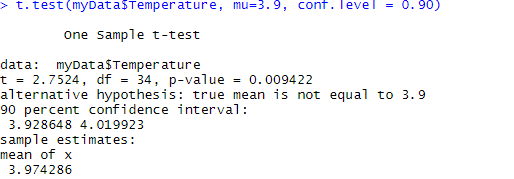
T stat= (3.974286 – 3.9)/ (.159674/sqrt(35))= 2.75237



Pvalue = .0094

1. Give your inference

Sol 3. As we can see from above, pvalue i.e. .0094 is less the alpha (ie. 0.1) fail to reject the null hypothesis i.e H0 >=3.9 C.



As we can see from the t-test that our null hypothesis stats that Cold storage is not able to maintain temperature below 3.9 C.

So corrective action is required by the supervisor in the cold storage plant.