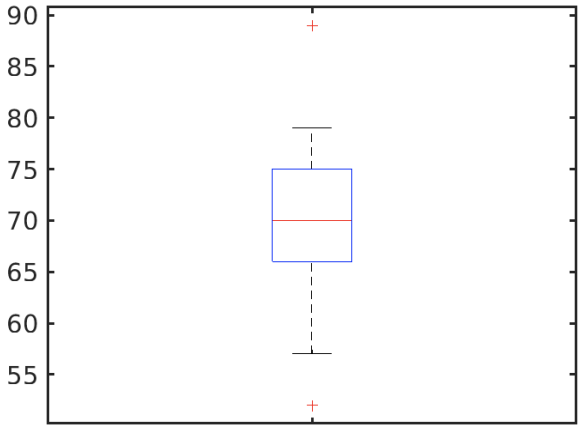
MGMT 571 Homework 1

1. Consider the following boxplot, which of the following is NOT true?



   (a) The red line in the middle is the median.
   (b) The maximum data 89 is an outlier.
   (c) The minimal data 52 is an outlier.
   (d) None of the above.

2. Consider the following table, what is the Chi-square (χ^2) statistic and the degree of freedom for testing the independence of two variables Student and Type?

	Type		
Student	A	B	C
Yes	60	100	30
No	50	90	20

3. Customer retention is important in view of the customer lifetime value, meaning that customers who stay with a company for a very long time give more value to the company than customers who often switch service providers. Churn, also called attrition, is a term used to indicate a customer leaving the service of one company in favor of another company. Churn analysis is prevalent in competitive industries such as mobile communication services, internet services, and retail banking services because customers may easily switch among companies looking for new features, promotion and other factors. There have been many case studies available online. The churn data set was taken from the UCI Repository of Machine Learning Databases at the University of California, Irvine. The data set contains information on 20 variables for 3333 customers, along with an indication of whether or not that customer churned. The 20 potential predictor variables are as follows:

- State: for the 50 states and the District of Columbia
- Account length: how long account has been active
- Area code: phone area code
- Phone number: essentially a surrogate for customer ID
- International Plan: yes or no
- VoiceMail Plan: yes or no
- Number of voice mail messages
- Total day minutes: minutes customer used service during the day
- Total day calls
- Total day charge: perhaps based on foregoing two variables
- Total evening minutes: minutes customer used service during the evening
- Total evening calls
- Total evening charge: perhaps based on foregoing two variables
- Total night minutes: minutes customer used service during the night
- Total night calls
- Total night charge: perhaps based on foregoing two variables
- Total international minutes: minutes customer used to make international calls
- Total international calls
- Total international charge: perhaps based on foregoing two variables
- Number of calls to customer service

Use data sets **Churn.sas7bdat** or **Churn.csv** from Brightspace and answer the following questions. **For each question, please provide your short answers and the evidence from SAS EM outputs if needed**. Remember we only use the above 20 potential predictor variables and one target variable ("Chrun"). The other variables should be set to "Rejected" when you read in the data.

(a) Create a project in SAS EM using your last name + Churn, e.g., **Sun Churn**.
(b) Create a library and import the **Churn.sas7bdat** data to the library.
(c) Also, try to import the csv data **Churn.csv** directly using File Import node.
(d) Determine the variable role and measurement level for each variable.
(e) Compare the Area code and State fields. Discuss any apparent abnormalities.
(f) Use a graph to determine visually whether there are any outliers in **Total international calls**.
(g) Does a 2D scatter plot between **Number of calls to customer service** and **Total day minutes** (group by the target variable) reveal any information?
(h) Utilize the Chi-square table with a significance level of 0.05 to determine which, out of the 20 predictor variables, are useful in predicting customer churn.