

No books or notes. No cellphone or wireless devices. Write clearly and show your work for every answer.

Name: _____

Question:	1	2	3	Total
Points:	40	30	30	100
Score:				

1. The following numbers form a sample of size 15 randomly selected from a large population:

3.0337	3.5437	2.5573	2.3133	4.4635
2.9750	5.2821	2.9983	4.7853	5.0585
5.1927	5.4394	3.3518	5.4513	3.0764

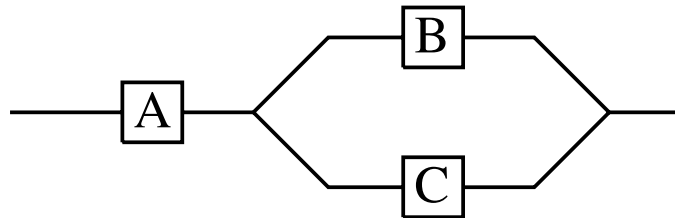
- (a) (10 points) Compute the median and fourth spread and find eventual outliers.

- (b) (10 points) Knowing that $\sum_{i=1}^{15} x_i = 59.522$ and $\sum_{i=1}^{15} x_i^2 = 254.77$ compute the sample average and standard deviation.

(c) (10 points) Draw a box plot for the data.

(d) (10 points) Sketch an histogram of the data.

2. Consider the circuit depicted in the figure.



You know that the entire circuit work if and only if element A and at least one between elements B and C work. Assume that the probability that A works is 0.9 while the probability that B works is 0.7 and the probability that C works is 0.7. Each element works or not independently from the others.

- (a) (10 points) Compute the probability that the entire circuit works.

- (b) (10 points) Assume that B does not work, what is the probability that the entire circuit works.

- (c) (10 points) What is the probability that element A does not work given that the circuit does not work? What is the probability that element B does not work given that the circuit does not work?

3. You repeat 100 times an experiment that has a probability of 0.01 to succeed. Let X the r.v. that describes the number of successes you obtain.

(a) (10 points) Find the expected value $E(X)$ and the variance $V(X)$ of X .

(b) (10 points) Compute the probability that $X = 1$ and the probability that $X = 2$.

- (c) (10 points) Call Y the r.v. that gives the position of the first success in the sequence of trials. Compute the average of Y given that $X = 1$. (**Hint:** if you know that $X = 1$, i.e. there is only one success, what is the probability that this is the first trial, or the second, or ...)