

Homework 2

Given the following data of the amount of benevolent giving that was obtained from door-to-door solicitations. The amount of the donations are in dollars.

House	Donation	House	Donation	House	Donation	House	Donation
1	5	6	0	11	0	16	0
2	15	7	10	12	10	17	20
3	0	8	2	13	30	18	1
4	0	9	5	14	4	19	12
5	5	10	7	15	5	20	5

We want to get an idea of the amount of a donation that one would expect to receive in the neighborhood from which the above information was obtained. To that end:

1. Draw a histogram using an interval of 5.
2. Find the 1st, 2nd, and 3rd quartiles.
3. Find the range.
4. Find the interquartile range (IQR).
5. Draw a box plot. Identify on the box plot the following:
 - (a) the two hinges
 - (b) the two inner fences
 - (c) maximum
 - (d) minimum
 - (e) median

6. In the parking lot across the street, there are 20 automobiles. The parking lot attendant at my request recorded the license plate number of each car and gave the list to me an hour ago. On the same list, the attendant recorded beside each license plate number, the blue book value of the car in thousands of dollars. Therefore $\mathcal{P} = \{\text{cars in parking lot}\}$ and \mathcal{L} =record from the attendant. The information that the attendant gave to me is contained the following table.

For the above data find:

- (a) 1st Quartile:
- (b) 2nd Quartile:
- (c) 3rd Quartile:

Car	Value	Car	Value	Car	Value	Car	Value
1	1	6	8	11	7	16	16
2	6	7	9	12	1	17	10
3	10	8	2	13	5	18	8
4	5	9	5	14	15	19	6
5	4	10	30	15	50	20	3

- (d) IQR:
(e) Right Inner Fence:
(f) Population Mean:
(g) Identify any outliers.
(h) Population Standard Deviation:
(i) On the template below, draw a box plot of the data. A title, legend, and labeling of the axes are not necessary.



- (j) What percentage of the points lie within the box?
7. The three salaries of junior members of a law firm are: \$55,000, and the salary of the senior member is: \$105,000. The mean salary is: \$67,500 and the median salary is: \$55,000. Suppose you are considering the idea of working for this law firm . The senior member tells you that an "average employee" earns \$67,500 whereas one of the junior members tells you that an "average employee" earns \$55,000. Which answer can you believe and explain?
8. A combination of two leaf and stem plots like the one constructed below is called a butterfly chart. The left side of this butterfly chart is based on the scores of seven engineers each of whom gave a score to a product called D2. They also gave a score from which the right side of the butterfly chart is based to another product called EPROD The scores follow the scale of 1 to 6; 1 is BAD and 6 is EXCELLENT. Which product do the engineers like better? Explain.

	D2		EPROD
10		1	3
	4	2	4
7		3	4
	2	4	3
	3	5	8
	4	6	9
		7	
		8	
		9	
		10	

9. In a controlled experiment in which a new model of an automobile is driven into a rigid wall, sensors which are embedded in dummies record the resulting forces on the head, neck, and chest. The measured forces on the chest of a dummy representing a typical three year old child strapped in a child seat and the measured forces on a typical female adult strapped by a seat belt were taken. Both dummies were placed in the same car and in the rear seats. Two sets of measurements of the forces on the chest are given in Table 9. The measurements for the three year old child dummy appear in column 2, and the measurements for the female adult dummy appear in column 4. Based on these measurements and on a formula, the probability of sustaining serious injuries are calculated and from another formula, the coefficient of resiliency of the restraint system is calculated. The coefficients of resiliency for the child seats appears in column 3, and the corresponding coefficients for the seat belts appear in column 5. The higher the coefficient of resiliency, the safer the occupant.

ID number	Three Year Old		Female Adult	
	Force on Chest	Coefficient of Resiliency	Force on Chest	Coefficient of Resiliency
1	60	1.75	49	1.48
2	48	1.85	42	1.51
3	50	1.83	52	1.49
4	56	1.76	62	1.47
5	50	1.79	45	1.47
6	47	1.78	27	1.58
7	55	1.74	36	1.53
8	42	1.75	42	1.50
9	41	1.80	61	1.47
10	53	1.99	33	1.59
11	50	1.83	48	1.51

- (a) Calculate the mean, median, and quartiles for columns 2 through 5.
- (b) Draw boxplots of the coefficients of resiliency.
- (c) Which restraint system, child seat or seat belt, protects the occupant better?

10. Twelve judges at a county fair tasted three categories of sauerkraut: sweet, sour, and bitter and assigned scores to each. From 36 scores, the following correlation matrix was constructed.

Table 1: Correlation Matrix

	Sweet	Sour	Bitter
Sweet	1	-0.784	-0.118
Sour	-0.784	1	0.555
Bitter	-0.118	0.555	1

- (a) What is the correlation between sweet and sour sauerkraut?
- (b) Identify the strong and weak correlations.
 - i. Strong
 - ii. Weak
- (c) Explain the meaning of negative and positive correlation.