

PHYSICS 101
ASSIGNMENT #2

1. You are given $n = 8$ measurements: 3, 2, 5, 6, 4, 4, 3, 5.
 - a. Find \bar{x} .
 - b. Find \tilde{x} .
 - c. Based on the results of parts a and b, are the measurements symmetric or skewed? Draw a dotplot to confirm your answer.

2. You are given $n = 8$ measurements: 3, 1, 5, 6, 4, 4, 3, 5.
 - a. Calculate the range.
 - b. Calculate the sample mean.
 - c. Calculate the sample variance and standard deviation.
 - d. Compare the range and the standard deviation. The range is approximately how many standard deviations?

3. A group of experimental animals are infected with a particular form of bacteria, and their survival time is found to average 32 days, with a standard deviation of 36 days. You can analyze the data to see why the distribution of survival times could not be bell-shaped.
 - a. Find the value of x that is exactly one standard deviation below the mean.
 - b. If the distribution is in fact bell-shaped, approximately what percentage of the measurements should be less than the value of x found in part a?
 - c. Since the variable being measured is time, is it possible to find any measurements that are more than one standard deviation below the mean?
 - d. Use your answers in part b and c to explain why the data distribution cannot be bell-shaped.

4. The weights (in kilograms) of the 27 packages of ground beef in a supermarket meat display are listed here in order from smallest to largest:

.75	.83	.87	.89	.89	.89	.92
.93	.96	.96	.97	.98	.99	1.06
1.08	1.08	1.12	1.12	1.14	1.14	1.17
1.18	1.18	1.24	1.28	1.38	1.41	

- a. Confirm the values of the mean and standard deviation, as $\bar{x} = 1.05$ kg and $s = 0.17$ kg.
- b. The two largest packages of meat weigh 1.38 and 1.41 kg. Are these two packages unusually heavy? Explain.
- c. Construct a box plot for the package weights. What does the position of the median line and the length of the whiskers tell you about the shape of the distribution?

5. The number of television viewing hours per household and the prime viewing times are two factors that affect television advertising income. A random sample of 25 households in a particular viewing area produced the following estimates of viewing hours per household:

3.0	6.0	7.5	15.0	12.0
6.5	8.0	4.0	5.5	6.0
5.0	12.0	1.0	3.5	3.0
7.5	5.0	10.0	8.0	3.5
9.0	2.0	6.5	1.0	5.0

- a. Scan the data and use the range to find an approximate value for s . Use this value to check your calculations in part b.
 - b. Calculate the sample mean \bar{x} and the sample standard deviation s . Compare s with the approximate value obtained in part a.
 - c. Find the percentage of the viewing hours per household that falls into the interval $\bar{x} \pm 2s$. Compare with the corresponding percentage given by the “68-95-99.7 Rule”.
6. A random sample of 100 foxes was examined by a team of veterinarians to determine the prevalence of a particular type of parasite. Counting the number of parasites per fox, the veterinarians found that 69 foxes had no parasites, 17 had one parasite, and so on. A frequency tabulation of the data is given here:

Number of Parasites, x	0	1	2	3	4	5	6	7	8
Number of Foxes, f	69	17	6	3	1	2	1	0	1

- a. Construct a relative frequency histogram for x , the number of parasites per fox.
- b. Calculate \bar{x} and s for the sample.
- c. What fraction of parasite counts fall within two standard deviations of the mean? Within three standard deviations? Do these results agree “68-95-99.7 Rule”?