

Data Analysis: Assignment 03

1. The weekly demand for a product approximately has a normal distribution with mean 1000 and standard deviation 200. The current on hand inventory is 2200 and no deliveries will be occurring in the next two weeks. Assuming that the demands in different weeks are independent,

- a) What is the probability that the demand in each of the next 2 weeks is less than 1100?
- b) What is the probability that the total of the demands in the next 2 weeks exceeds 2200?

(Use $P(Z < 0.5) = 0.6915$ and $P(Z > 1/\sqrt{2}) = 0.2399$ where Z is a random variable following a standard normal distribution)

2. The sample mean and sample standard deviation on your economics examination were 60 and 20, respectively; the sample mean and sample standard deviation on your statistics examination were 55 and 10, respectively. You scored 70 on the economics exam and 62 on the statistics exam. Assuming that the two histograms of test scores are approximately normal histograms,

- a) On which exam was your percentile score highest?
- b) Approximate the percentage of the scores on the economics exam that were below your score.
- c) Approximate the percentage of the scores on the statistics exam that were below your score.

(Use $P(Z < 0.5) = 0.6915$ and $P(Z < 0.7) = 0.7580$ where Z is a random variable following a standard normal distribution)

3. The time it takes a central processing unit to process a certain type of job is normally distributed with mean 20 seconds and standard deviation 3 seconds. If a sample of 15 such jobs is observed, what is the probability that the sample variance will exceed 12?

(Use $P\left(\chi_{14}^2 > \frac{56}{3}\right) = 0.1781$ where χ_{14}^2 is a chi-square random variable with degree of freedom 14)

4. An electric scale gives a reading equal to the true weight plus a random error that is normally distributed with mean 0 and standard deviation $\sigma = 0.1$ mg. Suppose that the results of five successive weighings of the same object are as follows: 3.142, 3.163, 3.155, 3.150, 3.141.

- a) What is Determine a 95 percent confidence interval estimate of the true weight.
b) Determine a 99 percent confidence interval estimate of the true weight.

(Use $P(Z > 1.96) = 0.025$ and $P(Z > 2.58) = 0.005$ where Z is a random variable following a standard normal distribution)

5. A public health official claims that the mean home water use is 350 gallons a day. To verify this claim, a study of 20 randomly selected homes was instigated with the result that the average daily water uses of these 20 homes were as follows:

340 344 362 375

356 386 354 364

332 402 340 355

362 322 372 324

318 360 338 370

Do the data contradict the official's claim?

(**Hint** Use $H_0: \mu = 350$ versus $H_1: \mu \neq 350$, and $P(t_{19} > 1.730) = 0.05$)