Homework #6
Stat 202

1.114 Total scores. Here are the total scores of 10 students in an introductory statistics course. STATCOURSE

68 54 92 75 73 98 64 55 80 70

Previous experience with this course suggests that these scores should come from a distribution that is approximately Normal with mean 70 and standard deviation 10.

(a) Using these values for μ and σ, standardize the first exam scores of these 10 students.

(b) If the grading policy is to give grades of A to the top 15% of scores based on the Normal distribution with mean 70 and standard deviation 10, what is the cut-off for an A in terms of a standardized score?

(c) Which students earned a grade of A on the final exam for this course?

1.115 Assign more grades. Refer to the previous exercise. The grading policy says the cut-offs for the other grades correspond to the following: bottom 5% receive F, next 10% receive D, next 40% receive C, and next 30% receive B. These cut-offs are based on the $N(70, 10)$ distribution.

(a) Give the cut-offs for the grades in this course in terms of standardized scores.

(b) Give the cut-offs in terms of actual total scores.

(c) Do you think that this method of assigning grades is a good one? Give reasons for your answer.

1.116 A uniform distribution. If you ask a computer to generate "random numbers" between 0 and 1, you will get observations from a **uniform distribution.** Figure 1.34 graphs the density curve for a uniform distribution. Use areas under this density curve to answer the following questions.

(a) Why is the total area under this curve equal to 1?

(b) What proportion of the observations lie below 0.35?

(c) What proportion of the observations lie between 0.35 and 0.65?

FIGURE 1.34 The density curve of a uniform distribution, for Exercise 1.116.

1.117 Use a different range for the uniform distribution. Many random number generators allow users to specify the range of the random numbers to be produced. Suppose that you specify that the outcomes are to be distributed uniformly between 0 and 4. Then the density curve of the outcomes has constant height between 0 and 4, and height 0 elsewhere.

(a) What is the height of the density curve between 0 and 4? Draw a graph of the density curve.

(b) Use your graph from (a) and the fact that areas under the curve are proportions of outcomes to find the proportion of outcomes that are less than 1.

(c) Find the proportion of outcomes that lie between 0.5 and 2.5.

1.118 Find the mean, the median, and the quartiles. What are the mean and the median of the uniform distribution in Figure 1.34? What are the quartiles?

Solutions

1.114. **(a)** For example, $\frac{68-70}{10} = -0.2$. The complete list is given on the right. **(b)** The cut-off for an A is the 85th percentile for the $N(0, 1)$ distribution. From Table A, this is approximately 1.04; software gives 1.0364. **(c)** The top two students (with scores of 92 and 98) received A's.

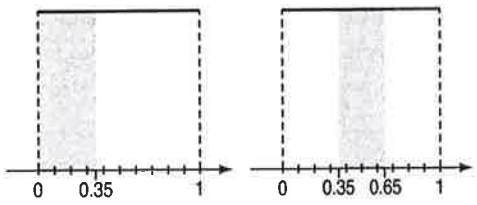
68	−0.2
54	−1.6
92	2.2
75	0.5
73	0.3
98	2.8
64	−0.6
55	−1.5
80	1
70	0

1.115. **(a)** We need the 5th, 15th, 55th, and 85th percentiles for a $N(0, 1)$ distribution. These are given in the table on the right. **(b)** To convert to actual scores, take the standard-score cut-off z and compute $10z + 70$. **(c)** Opinions will vary.

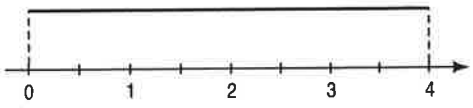
	Table A		Software	
	Standard	Actual	Standard	Actual
F	−1.64	53.6	−1.6449	53.55
D	−1.04	59.6	−1.0364	59.64
C	0.13	71.3	0.1257	71.26
B	1.04	80.4	1.0364	80.36

Note: *The cut-off for an A given in the previous solution is the* lowest *score that gets an A—that is, the point where one's grade drops from an A to a B. These cut-offs are the points where one's grade jumps* up. *In practice, this is only an issue for a score that falls exactly on the border between two grades.*

1.116. **(a)** The curve forms a 1×1 square, which has area 1.
(b) $P(X < 0.35) = 0.35$.
(c) $P(0.35 < X < 0.65) = 0.3$.



1.117. **(a)** The height should be $\frac{1}{4}$ since the area under the curve must be 1. The density curve is on the right. **(b)** $P(X \leq 1) = \frac{1}{4} = 0.25$.
(c) $P(0.5 < X < 2.5) = 0.5$.



1.118. The mean and median both equal 0.5; the quartiles are $Q_1 = 0.25$ and $Q_3 = 0.75$.