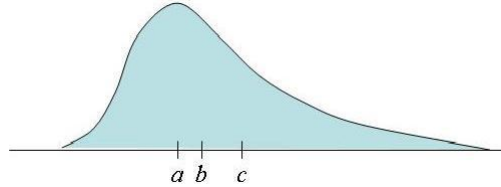


1. (8 pts) In the distribution shown below,
 - (a) Give a verbal description of the distribution, using appropriate statistical terminology.
 - (b) Three points are labeled a , b , and c . They represent the mean, the median, and the mode of the distribution (not necessarily in that order). Tell which is the mean, which is the median, and which is the mode.



2. (20 pts) The following set of quiz scores was received in a class. There were 20 points possible on the quiz.

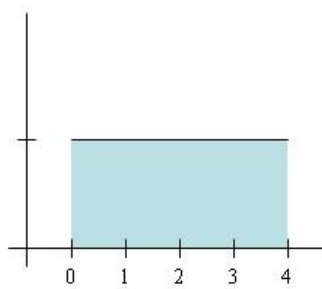
0 0 2 8 12 13 18 19 20 20 20

Find the following statistics for these data.

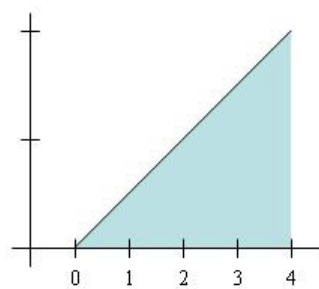
- (a) (3 pts) The mean
 - (b) (4 pts) The standard deviation
 - (c) (5 pts) The five-number summary
 - (d) (4 pts) The interquartile range (IQR)
 - (e) (4 pts) The 70th percentile, using the formula $r = 1 + \frac{p}{100}(n - 1)$.
3. (4 pts) Draw a boxplot of the data in the previous problem.
 4. (14 pts) The following two diagrams represent distributions (pdfs) of the number of hours it takes for a company's help desk to respond to an e-mail request for help. As you answer the questions below, consider the following two hypotheses.

H_0 : The correct distribution is the one on the left.

H_1 : The correct distribution is the one on the right.



H_0 distribution



H_1 distribution

- (a) (3 pts) In each diagram, what is the total area under the curve?
- (b) (3 pts) At the tick marks on the vertical axes, indicate the correct values.
- (c) (8 pts) One response time will be measured. The decision rule is that if it is less than 2 hours, then H_0 will be accepted. Otherwise, H_0 will be rejected. Find the values of α and β . (They will turn out to be relatively large.)
5. (12 pts) For the standard normal random variable Z , find the following.
- (a) $P(Z < -1.38)$
- (b) $P(1.15 < Z < 2.96)$
- (c) The 15th percentile
6. (12 pts) Assume that IQ scores are normally distributed with a mean of $\mu = 100$ and a standard deviation of $\sigma = 15$.
- (a) What proportion of the population has an IQ greater than 125?
- (b) What proportion of the population has an IQ between 85 and 115?
- (c) The Pointy-headed Society will admit as members only those with an IQ in the top 1% of the population. What is the minimum IQ required for membership in this society?
7. (10 pts) In a dice game, the player rolls two dice. If the total of the two numbers is 7, then he wins \$5.00. If the total is 6 or 8, then he wins \$3.00. If the total is anything else, then he loses \$4.00. Let X be the amount of money won in one round of this game. (X is negative if the player loses.) The following is the probability distribution function of X .

x	$p(x)$
\$5.00	3/18
\$3.00	5/18
-\$4.00	10/18

- (a) Find the expected value of X .
- (b) Find the standard deviation of X .
8. (10 pts) Suppose that 20% of all income tax returns contain errors. Let \hat{p} represent the proportion of returns containing errors in a random sample of $n = 2$ returns.
- (a) Find the sampling distribution of \hat{p} . Write it as a table, showing each possible value of \hat{p} along with its probability.
- (b) What are the mean and standard deviation of this distribution?
9. (10 pts) In the situation of the previous problem, now let \hat{p} represent the proportion of returns containing errors in a random sample of $n = 500$ returns. What is the probability that \hat{p} is more than 22%?