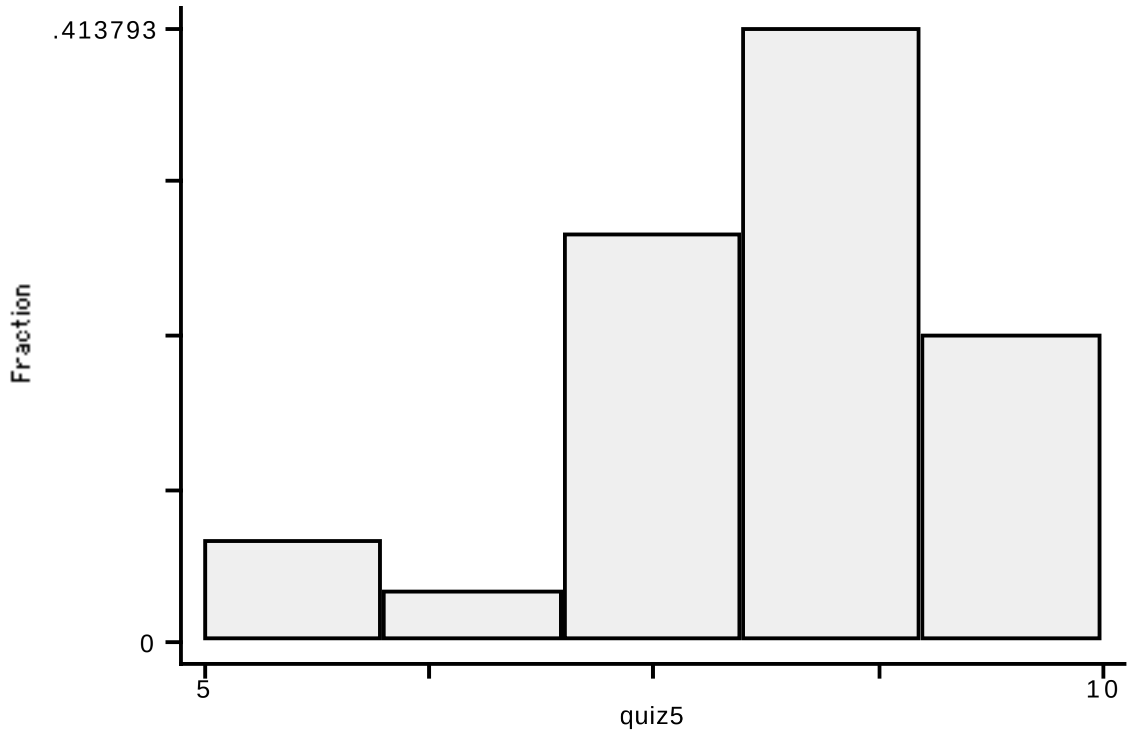
Scores:
Average: 7.7, SD 1.2 Min 5 Max 10, Median 8.



Quiz 5
May 10, 2001
Stats M12

Imagine rolling two fair, six-sided dice. In many games, rolling "two of a kind" is a significant event. For example, two "aces", or two "sixes."

a) What's the probability of rolling two of a kind? (Hint, there are a total of 36 possible outcomes.)

6/36 (The events of interest are (1,1), (2,2), (3,3), (4,4) (5,5) and (6,6))

b) You win a special prize if your roll is either two aces or two sixes. What's the probability you win the prize?

2/36 = P(roll two aces OR roll two sixes) = P(roll two aces) + P(roll two sixes) = 1/36 + 1/36

c) Are the events "roll two aces" and "roll two sixes" independent, mutually exclusive, both, or neither? Explain.

They are mutually exclusive, but not independent. They are mutually exclusive because if one occurs, say two aces, then the other event did not occur. They are NOT independent. For example, knowledge that two aces occurred tells you everything you need to know about whether or not two sixes occurred.

This is very confusing, partially due to a subtlety of the language. Compare these two situations:
Situation 1: Toss two dice (just one time!)
Event A: Two aces appear
Event B: Two sixes appear.

Situation 2: Toss two dice two times.
Event C: two aces appear on first toss
Event D: two sixes appear on second toss

In the first situation, we are talking about an experiment that consists of a single roll. So A and B are mutually exclusive since they can't both happen. (This is the situation of the problem.)

In the second situation, events C and D are not mutually exclusive. It's possible for two aces to appear on the first toss and then two sixes on the second. They are, however, independent, since if I tell you whether or not C occurred, it does not affect the probability about whether D will occur.

The trick is to focus your attention on the experiment being performed, and not on the outcomes. For example, if I say that you flip a coin and A = event coin is heads and B = event coin is tails, then A and B are mutually exlusive because the coin can't be both. What's important here is that our experiment consisted of only one flip. But if we flip the coin twice, then its possible that the coin come up heads one toss and tails the next, and so A = one flip is a head and B = one flip is a tail are not mutually exclusive.