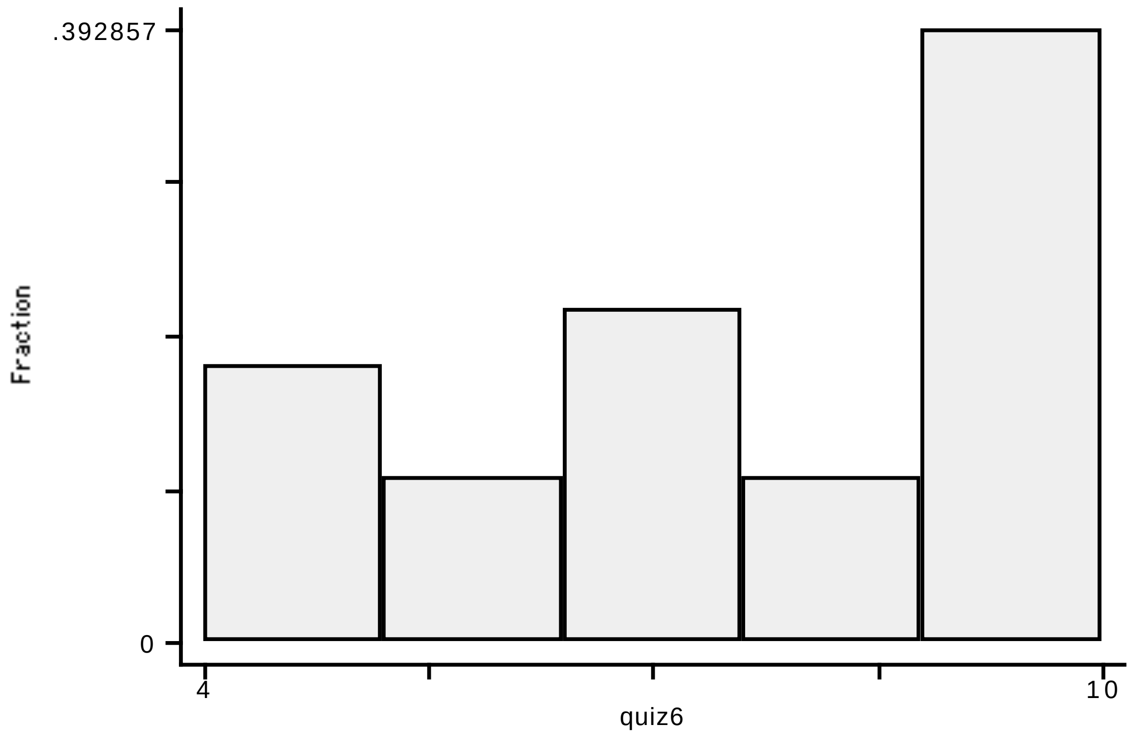
Quiz 6

Thursday, May 17
Scores



Avg: 7.6, SD = 1.9, min = 4, max = 10
median = 7.5

Suppose that 40% of dentists who chew gum chew Brand X. A survey is conducted in which, from all dentists who chew gum, 10 are selected randomly and with replacement. Let X represent the number in the sample who chew Brand X.

a) Is X a binomial random variable? Why or why not?

Yes:
1) There is a fixed number (n = 10) trials.
2) There are only two outcomes of each trial (dentist chews gum or does not).
3) Each trial is independent. (Whether or not one dentist says he chews gum has no effect on the next)
4) The probability that a dentist will say "yes", is the same (p = .40) at each trial.
5) X counts the number of dentists out of 10 who say "yes".

b) What is the expected number of dentists in our sample who will chew Brand X?

For a binomial RV, E(X) = np = 10*.4 = 4.

You can also use E(X) = sum(x*p(x)) = 0*P(X = 0) + 1*P(X =1) + ... + 10*P(X =10). Not only is this tedious, but it requires that you remember the formula for computing binomial probabilities: P(X = x) = (n! / (n-x)!x!) p^x (1-p)^(n-x).

p^x means "p raised to the x power."

c) What is the standard deviation for the number of dentists in our sample who will chew Brand X?

For a binomial RV, SD(X) = sqrt(n*p*(1-p)) = sqrt(10*.4*.6) = 1.54919

You can also use SD(X) = sqrt(sum (x-mu)^2 p(x)) but this is quite tedious.

d) (1 point): Which is more likely: Our sample will have 3 Brand-X chewers or our sample will have 6 Brand X chewers?

3 is more likely to occur than 6. First, if you remember the formula for binomial probabilities, you can compute the probabilities and see directly. If not, you can also reason that 3 is closer to the expected value than 6.