PSYC 225 -- Dr. King

The Distribution of Sample Means (chap 7)

sampling error = sample mean - true population mean

the standard error of the (sample) mean tells you how much sampling error there is likely to be - so how do you get that?

sampling distribution (of the mean) - a distribution (histogram) of sample means obtained by selecting all possible samples of size n from a population (it's a theoretical thing!)

example: the Pearson fathers data (see reverse for histogram)
mean = 67.687
sd(pop) = 2.745
N = 1078

the central limit theorem - gives the properties of the sampling distribution

"For any population with mean mu and standard deviation sigma, the distribution of sample means for sample size n will have a mean of mu and a standard deviation of sigma/sqrt(n) and will approach a normal distribution as n approaches infinity."

* the mean of the sample means will be the same as the mean of the population
* the standard deviation of the sample means will be the standard deviation of the population divided by the square root of the sample size
* this number is called the standard error of the mean
* we usually have to estimate that by using the sample standard deviation
* as n gets larger (30 or more) the sampling distribution rapidly approaches a normal distribution - this means we can use the z-table to find out what sample means are likely and unlikely
* if the population is normal to begin with, the sampling disbribution will be normal regardless of n
* in these cases: 68% of the sample means will be within one sem of mu
  95% of the sample means will be within two sems of mu
  > 99% of the sample means will be within three sems of mu

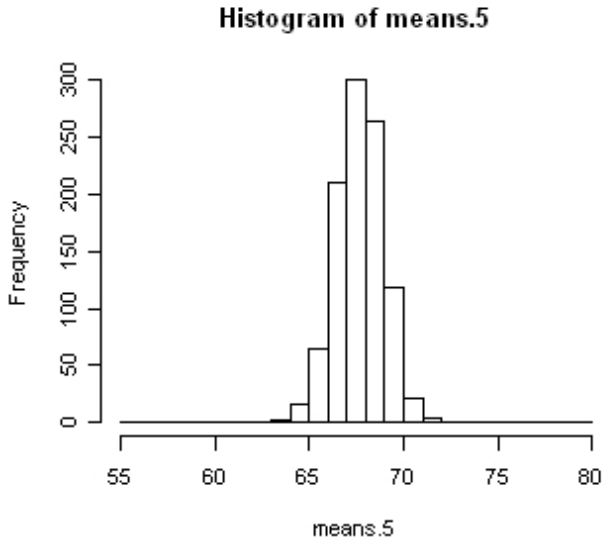
in short, this is the same stuff we did in chapter 6, but using the sem rather than the standard deviation to get z

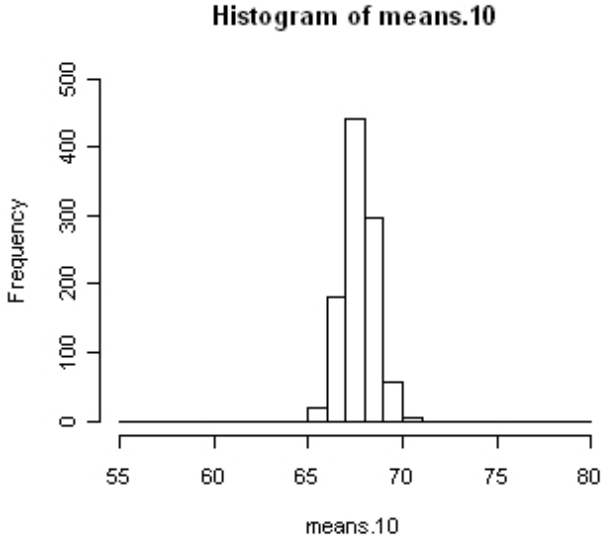
for an individual raw score: z = (x - mu)/sd
for a sample mean: z = (mean - mu)/sem

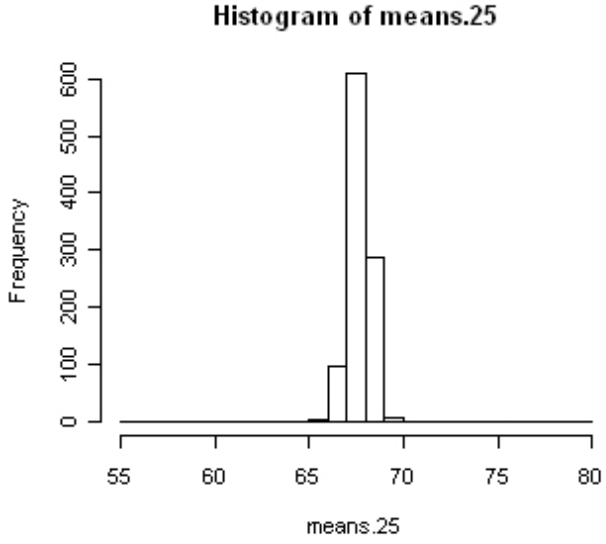
problems you should look at:

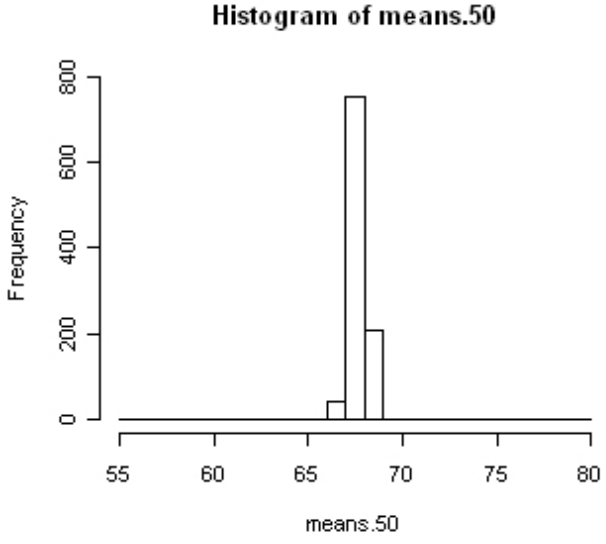
7th ed: 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
6th ed: 2, 4, 5, 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23

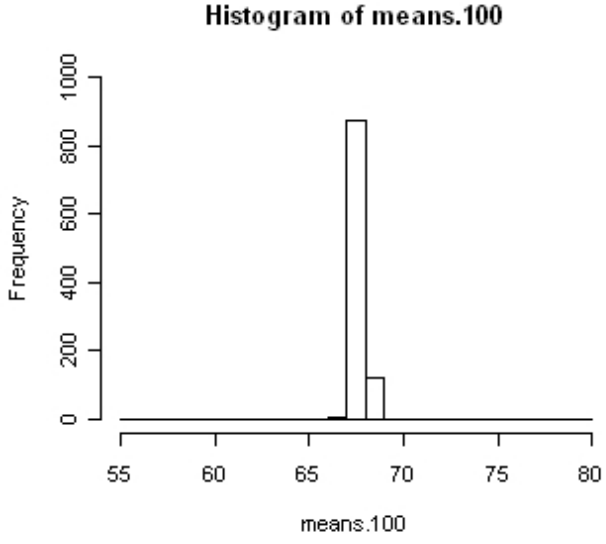

Histogram of fathers
Frequency
0
50
100
150
55
60
65
70
75
80
fathers


Histogram of means.5
Frequency
0
50
100
150
200
250
300
55
60
65
70
75
80
means.5


Histogram of means.10
Frequency
0
100
200
300
400
500
55
60
65
70
75
80
means.10


Histogram of means.25
Frequency
0
100
200
300
400
500
600
55
60
65
70
75
80
means.25


Histogram of means.50
Frequency
0
200
400
600
800
55
60
65
70
75
80
means.50


Histogram of means.100
Frequency
0
200
400
600
800
1000
55
60
65
70
75
80
means.100