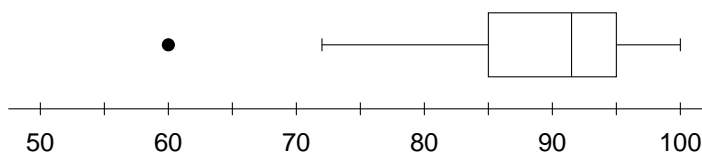


(46, 74.75, 78, 84.25, 96),  $\bar{x} = 76.7 = C+$ .

1. (30 pts) (20, 24, 26, 29, 30),  $\bar{x} = 25.7 = B$ .

For parts (a) through (c), enter the data into the TI-83 into list  $L_1$ . Then press STAT, select CALC, and 1-Var Stats. Enter 1-Var Stats  $L_1$  and press ENTER.

- (a) The first number in the display is the mean 87.6.  
 (b) The standard deviation is  $Sx$ , not  $\sigma x$ . It's value is 12.50.  
 (c) Lower down is the five-number summary: Min = 60, Q1 = 85, Med = 91.5, Q3 = 95, and Max = 100.  
 (d) The IQR is  $Q3 - Q1 = 95 - 85 = 10$ .  
 (e) The *modified* boxplot should show outliers, if there are any. To see if there are any, compute  $1.5 \times \text{IQR} = 15$  and then compute the fences  $Q1 - 15 = 70$  and  $Q3 + 15 = 105$ . We see that there is one outlier, 60. Draw it separately as a dot. Extend the left whisker only as far as 72.



- (f) The  $z$ -score of 60 is  $z = \frac{60-87.6}{12.50} = -2.208$ .

2. (5 pts) (0, 4, 5, 5, 5),  $\bar{x} = 4.1 = B-$ .

Compute the  $z$ -scores for Susie's test and Jimmy's test and see whose is higher. Susie's  $z$ -score is  $\frac{95-85}{8} = 1.25$  and Jimmy's is  $\frac{86-65}{14} = 1.5$ . Relative to the class of each, Jimmy's score was better because he ranked higher in his class.

3. (10 pts) (0, 5.75, 8, 10, 10),  $\bar{x} = 7.1 = C-$ .

- (a) The probability  $P(X > 120)$  equals the area under the graph from 120 to 150. That is  $\frac{1}{100}(150 - 120) = \frac{30}{100} = 0.30$ . You should not use `normalcdf` because this is not a normal curve.  
 (b) The probability  $P(60 < X < 100)$  equals the area under the graph from 60 to 100. That is  $\frac{1}{100}(100 - 60) = \frac{40}{100} = 0.40$ .  
 (c) The five-number summary is the set of 5 numbers that divide the total area into four equal parts. Those 5 numbers are 50, 75, 100, 125, and 150. Apparently some people entered those 5 numbers into their calculator and found the five-number summary of them. That is a five-number summary of a five-number summary and it does not work. You need the five-number summary of the original set of all numbers from 50 to 150.

4. (12 pts) (0, 11.5, 12, 12, 12),  $\bar{x} = 10.4 = B+$ .

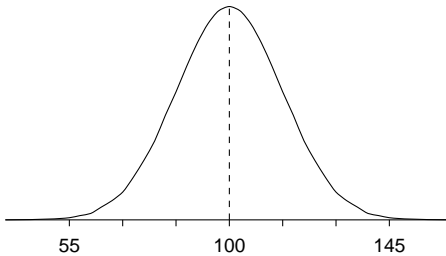
This is an exercise in using `normalcdf`.

- (a)  $P(Z > 1.28) = \text{normalcdf}(1.28, E99) = 0.1003$ .  
 (b)  $P(Z < 1.28) = \text{normalcdf}(-E99, 1.28) = 0.8997$ .  
 (c)  $P(-1.28 < Z < 1.28) = \text{normalcdf}(-1.28, 1.28) = 0.7995$ .

5. (15 pts) (5, 10, 14.5, 15, 15),  $\bar{x} = 12.4 = B$ .

The distribution of IQ scores is  $N(100, 15)$ .

- (a) The shape of the graph should be the bell curve. The scale should show three standard deviations each way, although it was ok if you showed only two. So the scale should go from 55 to 145.



- (b) The proportion of people with IQ scores between 80 and 120 is

$$\text{normalcdf}(80, 120, 100, 15) = 0.8176.$$

- (c) Use `invNorm` to find the quartiles. The first quartile is

$$\text{invNorm}(.25, 100, 15) = 89.88$$

and the third quartile is

$$\text{invNorm}(.75, 100, 15) = 110.11.$$

6. (8 pts) (3, 5.5, 8, 8, 8),  $\bar{x} = 6.8 = B$ .

The probability that  $X < 1.5$  is the area under the graph from 0 to 1.5. That shape is a triangle, so you should use the formula  $A = \frac{1}{2}bh$ . But first you need to find the height of the original graph. Its base is 2 and its area is 1, so  $1 = \left(\frac{1}{2}\right)(2)h = h$ . So the height is 1. Then, 1.5 is three-quarters the way from 0 to 2, so the height at 1.5 will be three-quarters of 1, or  $\frac{3}{4}$ . Now find the area:

$$\left(\frac{1}{2}\right)(1.5)\left(\frac{3}{4}\right) = 0.5625.$$

7. (10 pts) (0, 0, 2, 2.25, 8),  $\bar{x} = 2.0 = F$ .

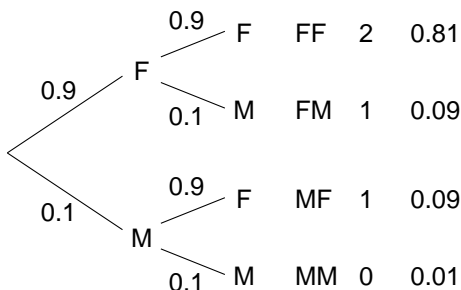
- (a) If the person does not have ESP, then  $p = 0.50$ . That is, they have a 50% chance of guessing correctly the color of a card. If they guess at 64 cards, then we have a sample of 64 guesses, a large enough sample to apply the Central Limit Theorem. It says that the distribution of  $\hat{p}$  is normal with mean  $p = 0.50$  and standard deviation  $\sqrt{\frac{0.50(1-0.50)}{64}} = 0.0625$ . You could summarize this by saying that  $\hat{p}$  is  $N(0.50, 0.0625)$  or you could draw a picture of the normal curve, labeling the relevant features.
- (b) Now that we know that  $\hat{p}$  is  $N(0.50, 0.0625)$ , we should use `normalcdf` to find the probability that  $\hat{p} \geq \frac{42}{64}$ . We get

$$\text{normalcdf}(42/64, E99, 0.50, 0.0625) = 0.0062.$$

You may have noted that the  $z$ -score of  $\frac{42}{64}$  is 2.5, making 42 correct guesses an unusually large number.

8. (10 pts) (0, 8, 9, 10, 10),  $\bar{x} = 8.1 = B$ .

It is very helpful to draw the tree diagram. Each branch for a female should be labeled 0.90 and each branch for a male should be labeled 0.10. On the right-hand side of the diagram, show the results (how many females) and get the probability of that result by multiplying the probabilities on the branches. You should get the following diagram:



Now summarize this in a table. The first column should show the possible values of  $\hat{p}$ . The possible proportions out of a sample of 2 are  $\frac{0}{2}$ ,  $\frac{1}{2}$ , and  $\frac{2}{2}$ . That is, 0, 0.5, and 1. Their probabilities are 0.01, 0.18, and 0.81, respectively:

$\hat{p}$	Prob.
0.0	0.01
0.5	0.18
1.0	0.81