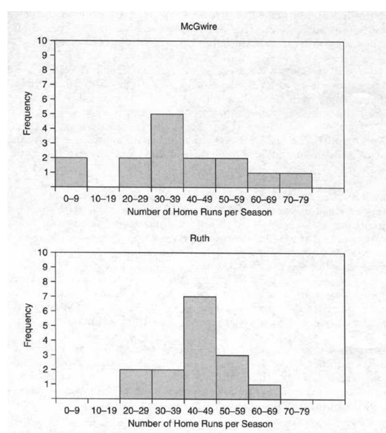
MCS-115

Answers to Homework: 7.6, 8.1, 8.2

7.6.5 It appears as though, for the most part, there is a relationship between the weight of a car and its miles per gallon. As the weight increases, the miles per gallon decrease. The only exception seems to be the weight of 1850, which gets more miles per gallon than the weight of 1700.

Here is a scatterplot of the data:

7.6.6 Histograms for the frequency of home-runs per season for McGwire and Ruth respectively:



Ruth's histogram shows that most of his data is spread over a smaller interval than McGwire's. McGwire's histogram shows that the interval that had the most seasons represented was 30-39 home-runs; however, Ruth's histogram shows that the interval that had the most seasons represented was 40-49. Also, from 40 to 79, Ruth appears to have about twice as mucn area as McGwire does in their repective histograms. Therefore, you can conclude that overall Ruth is a much better home-run hitter.

7.6.11 The relationship between weight and miles per gallon seems to be a line with a negative slope. If you continue this line until you reach 6000 on the x-axis, it seems like the miles per gallon should be close to 0. Considering 6000 pounds is a much larger value than the values in the data set, these data aren't very useful in predicting the miles per gallon for that great a weight. These data would most likely give a much better prediction for a car that weighs 2400 pounds.

7.6.24 Mean = 79.375. If his next quiz is an 80, the new mean will go up to 79.44 while if he scores a 79, the mean will go down to 79.33 .... With each newly added score, the mean moves a little toward the new score. The amount of movement decreases as the sample size gets large. In General, the lowest score that would increase his mean is the lowest score that is greater than the previous mean.

8.1.3 The Tooth Fairy payoff has expected value ($1)(1/3) + ($0.50)(1/3) + ($0.80)(1/3) = $0.77 (or $0.76 if the Tooth Fairy rounds down).

8.1.10 Explain Newcomb's paradox as suggested.

8.1.16 The best way to approach insurance problems is from the insurance company's viewpoint. What is the company's expected value from this deal? If the policy costs P dollars, then 80% of the time they will make P dollars and 20% of the time they will make $ – $700. (Here, making negative money means *losing* money.) The expected value is $(0.2)(P - 700) + (0.8)(P) = P - 140$. The insurance company would break even, on average, if the policy is a fair $140.

8.2.3 To calculate the number of people expected to be infected, we take the U.S. population, 280,000,000, and multiply by 0.02 (for 2%). This gives us 5,600,000 people who we can expect to be infected with this disease.

8.2.8 Answer: 80%.

	Think dyed	Think natural	
Dyed	.1B	.1B	.2B
Natural	.4B	.4B	.8B
	.5B	.5B	B

P(natural given think dyed)=$\frac{.4B}{.5B} = .8$.

8.2.10

	thinks they won	doesn't think they won	
Winner	180	20	200
Not a winner	9,980	89,820	99,800
	10,160	89,840	100,000

Probability you won a scholarship if the Prof. thinks you won is $\frac{180}{10{,}160} \approx 0.017$ or 1.7%.

8.2.18 We interpret the statement, "The witness is 80% sure ..." as, "With 80% accuracy, the witness sees a blue cab as blue and a green cab as green."

	Witness thinks blue	Witness thinks green	
Blue Cabs	.04C	.01C	.05C
Green Cabs	.19C	.76C	.95C
	.23C	.77C	C

Probability the cab was blue given that witness thought the cab was blue is $\frac{.04C}{.23C} \approx$ 0.1739 or 17%.