Econ 57
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Midterm Answers

1. Nonresponse bias. Those who are most likely to respond to this very long questionnaire are most likely to be dissatisfied

2.

	Higher Mean	Higher Median	Higher Standard Deviation
Case 1	same	same	same
Case 2	B	same	B
Case 3	same	same	B
Case 4	B	B	same

3. This is the fallacious law of averages.

4. Mrs. Romero is correct. This is like coin flips. As the sample size goes up, the chances of exactly 50-50 goes down. (The binomial probabilities are 0.50 for two children and 0.2461 for ten children.)

5. This is a classic puzzle, known as the Bertrand's box paradox. The answer would seem to be 1/2 since the gold coin has ruled the box with two silver coins, and the box with two gold coins and the box with one gold and one silver are the remaining two possibilities. However, Bayes' rule gives the correct answer, that there is a 2/3 probability the gold coin came from the box with two gold coins. Let GG, GS, and SS be the three boxes and "G" be the selection of a gold coin:

$$P[\text{GG if "G"}] = \frac{P[\text{GG}]P[\text{"G" if GG}]}{P[\text{GG}]P[\text{"G" if GG}] + P[\text{GS}]P[\text{"G" if GS}] + P[SS]P[\text{"G" if SS}]}$$
$$= \frac{(1/3)(1)}{(1/3)(1) + (1/3)(1/2) + (1/3)(0)}$$
$$= 2/3$$

Another way to think about it is that there are six, equally likely, coins that could be chosen. The chosen gold coin is equally likely to have come from each of the three gold coins, two of which are from the box with two gold coins.

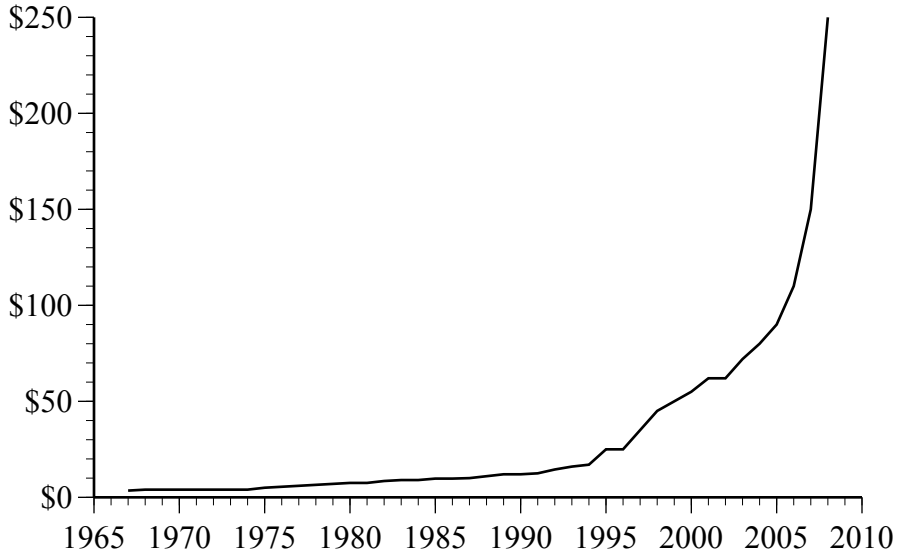
6. This is a multiplication rule problem. There are initially four non-aces among the six cards and a 4/6 probability of selecting a non-ace on the first card. If a non-ace is selected, there are three non-aces among the remaining five cards and a 3/5 probability of selecting one. Thus, P[two non-aces] = P[first not]P[second not|first isn't] = (4/6)(3/5) = 0.4. Notice that the player has less than a 50 percent chance, though some might think the reverse.

7. P[accepted by at least one] = 1 - P[rejected by all three] = 1 - $(2/3)^3$ = 0.7037.

8. The central limit theorem says that the probability distribution approaches a normal distribution as the number of independent draws being summed increases; so 10 coins flipped 100 times

9. There is surely self-selection bias, in that those who apply for these internships are likely to be interested in careers in these fields.

10. Time is inexplicably on the vertical axis. We are so accustomed to seeing time on the horizontal axis that it is very difficult to make sense of the figure. The figure below shows the same data, with time where it belongs—on the horizontal axis. This reversal of the axes reverses the conclusion, Yankee ticket prices did not slow down, but accelerated, after 1994. The annual rate of increase was 6 percent between 1967 and 1994, and 21 percent between 1994 and 2010.



An acceleration in Yankee Ticket Prices