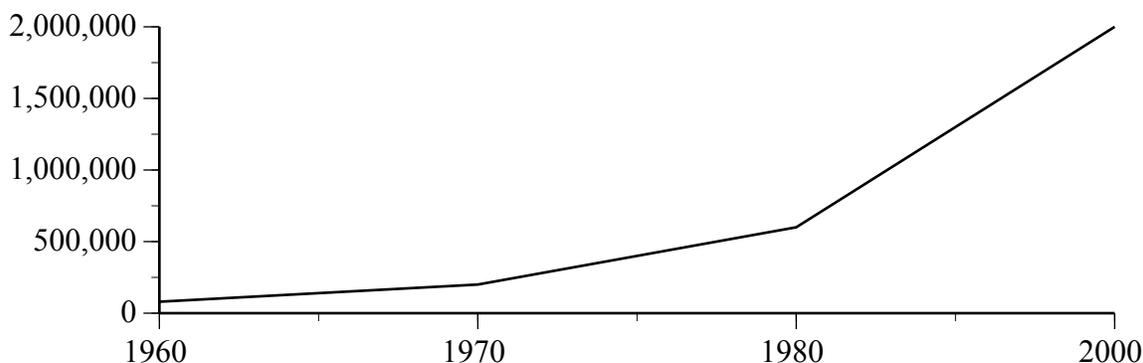


Midterm (75 minutes)

No calculators allowed. Just set up your answers, for example, $P = 49/52$. BE SURE TO EXPLAIN YOUR REASONING. If you want extra time, you can buy time at a price of 1 point a minute; for example, if your test is handed in 10 minutes after the scheduled finish time, 10 points will be subtracted from the test score.

1. Give three distinct reasons why this graph is misleading:

Number of U.S. Millionaires



2. An equal number of red and blue marbles are thoroughly mixed together in a large container, and two marbles are selected randomly. Explain why you either agree or disagree with this statement:
The probability of picking two balls of different colors is higher than the probability of picking two balls that are the same color.
3. For a woman who gives birth at age 35, the probability of having a baby suffering from Down syndrome is $1/270$. A test of the amniotic fluid in the mother's uterus is virtually 100 percent accurate in predicting Down syndrome, but costs about \$1,000 and can cause a miscarriage. A study of the effectiveness of an inexpensive blood test that does not risk miscarriage found that in 89 percent of the Down-syndrome cases, the test gave a positive reading, while in 75 percent of the cases without Down syndrome the test gave a negative reading. Of those cases where there is a positive reading, what fraction are false positives?

7. Two baseball teams will play up to 5 games against each other, with the winner being the first team to win 3 games. In each game, Team A has a 0.6 probability of winning and Team B has a 0.4 probability.
 - a. What is the probability that Team B will be the winner?

 - b. Do you think that Team B's chances of being the winner would be higher or lower if they played a series with the winner being the first team to win 4 games? Explain your reasoning.

8. A researcher is going to roll m six-sided dice n times, each time recording the sum of the numbers on the m dice and using a histogram to display the results of these n experiments. Which of the following histograms is more likely to be bell-shaped: 200 rolls of 5 dice or 1000 rolls of 1 die? Explain your reasoning.

9. Long ago, the astragali (heel bones) of animals were used as dice. An astragalus of a hooved animal has four sides. Experiments have shown that the probabilities of each of these four sides are 0.39, 0.37, 0.12, and 0.12. In ancient Greece, one game was to roll four astragali simultaneously, with the best outcome being a "Venus," in which each of the four different sides appears. What is the probability of rolling a Venus?

10. Explain why this Yahoo News Story is misleading:

Women, much-maligned by the opposite sex for their supposed lack of ability behind the wheel, make far safer and more law-abiding drivers than their male counterparts, British officials said.

Of those found guilty of all driving offenses by courts in England and Wales in 2002, 88 percent were male motorists, according to statistics published by the Home Office.