

**A.P. Statistics**  
**Assignment 6-7**

**Remember to show your thinking through your work.**

1. What are the conditions for using the normal approximation for a sampling distribution of means?

2. A laboratory weighs filters from a coal mine to measure the amount of dust in the mine atmosphere. Repeated measurements of the weight of dust on the same filter vary normally with a standard deviation of 0.08 milligram (mg) because the weighing is not perfectly precise. The dust on a particular filter actually weighs 123 mg. Repeated weighings will then have the normal distribution with mean 123 mg and standard deviation 0.08 mg.

- a. The laboratory reports the mean of 3 weighings. What is the distribution of this mean?

- b. What is the probability that the laboratory reports a weight of 124 mg or higher for this filter (the one that was weighed 3 times)?

3. The scores of 12th-grade students on the National Assessment of Educational Progress year 2000 mathematics test have a distribution that is approximately normal with mean of 300 and standard deviation of 35.
- a. Choose one 12th-grader at random. What is the probability that his or her score is higher than 300? Higher than 335?

- b. Now choose an SRS of four 12th-graders. What is the probability that their mean score is higher than 300? Higher than 335?

4. The number of accidents per week at a hazardous intersection varies with mean of 2.2 accidents and a standard deviation 1.4. This distribution takes on only whole number values, so it is certainly not normal.

- a. Let  $x$  be the mean number of accidents per week at the intersection during a year (52 weeks). What is the approximate distribution of  $x$  (consider the year to be a random sample of size 52)?

- b. What is the approximate probability that  $x$  is less than 2?

- c. What is the approximate probability that there are fewer than 100 accidents at the intersection in a year? (Hint: Restate this event in terms of  $x$ .)

5. The distribution of scores for persons over 16 years of age on an Wechsler Adult Intelligence Scale (WAIS) is approximately normal with mean 100 and standard deviation 15. The WAIS is one of the most common "IQ tests" for adults.

- a. What is the probability that a randomly chosen individual has a WAIS score of 105 or higher?

- b. What are the mean and standard deviation of the average WAIS score  $\bar{x}$  for an SRS of 60 people?

- c. What is the probability that the average WAIS score of an SRS of 60 people is 105 or higher?

- d. Would your answers to any of (a), (b), or (c) be affected if the distribution of WAIS scores in the adult population were distinctly non-normal?