University of California, Los Angeles
Department of Statistics

Statistics 13 **Instructor: Nicolas Christou**

Homework 3

EXERCISE 1
Suppose that the cholesterol level in the US adult women population follows the normal distribution with mean $\mu = 188 mg/dL$, and standard deviation $\sigma = 24 mg/dL$.

a. Sketch and label the normal curve.

b. Find the 25th and 75th percentile of this distribution, and calculate the interquartile range.

c. What proportion of women have cholesterol level above $220 mg/dL$?

d. What proportion of women have cholesterol level between 150 and $170 mg/dL$?

EXERCISE 2
Suppose that the height (X) in inches, of a 25-year-old man is a normal random variable with mean $\mu = 70$ inches. If $P(X > 79) = 0.025$ what is the standard deviation of this random normal variable?

EXERCISE 3
Suppose that the weight (X) in pounds, of a 40-year-old man is a normal random variable with standard deviation $\sigma = 20$ pounds. If 5% of this population is heavier than 214 pounds what is the mean μ of this distribution?

EXERCISE 4
The length of the tails of a certain breed of dogs follows the normal distribution with mean μ and standard deviation σ. It is known that 5% of the tails is longer than 12 inches. It is also known that 2.5% of the tails is shorter than 7 inches.

a. Find μ and σ.

b. Suppose that a dog is randomly selected. What is the probability that the length of its tail will be longer than 11 inches?

EXERCISE 5
An architect is designing the interior doors in an office building. She desires to make the heights of the doors great enough so that 95 percent of the people who use the doors will have at least 1 foot clearance. Assuming that the heights are normally distributed with mean 70 inches and standard deviation 3 inches, how high must the doors be?

EXERCISE 6
A machine that dispenses ketchup into plastic bottles provides amounts of ketchup that follow the normal distribution with mean 28 ounces and standard deviation 0.8. The consumer protection agency requires that only 7% of all the bottles of ketchup can be under the weight that is written on the bottles.

a. What weight should be printed on the bottles of ketchup?

b. Suppose that this machine dispenses ketchup into bottles that are labeled as 25-ounce bottles. You can adjust the mean amount dispensed, but you do not know the standard deviation. Suppose that the machine is set to dispense 25.8 ounces of ketchup, and you find that 11% of the bottles are underweight. What is the standard deviation?

EXERCISE 7

One thousand observations are randomly selected from a population that follows the normal distribution. Using your knowledge on boxplots, binomial distribution and of course normal distribution how many of these observations are expected to be outliers (suspected or serious)?

EXERCISE 8

At a certain hospital there are 100 available beds for patients at any given day. The probability that a patient will stay at the hospital for further observation is 10%. Suppose that patients arrive independently of each other.

a. Write an expression of the exact probability that, if 1000 patients arrive at this hospital at any given day, there will not be enough space for all the patients that must stay for further observation.

b. Approximate the above probability using the normal distribution.

c. How many additional beds will the hospital need if they want the above probability to be only 2%?