Principles of Biostatistics

Exam Two Review

1. In a certain town, 20\% of the residents are experiencing flu-like symptoms. In a random sample of 50 residents of this town, find the probability that
   (a) at most 15 have flu-like symptoms.
   (b) at least 7 have flu-like symptoms.
   (c) between 5 and 18 have flu-like symptoms.

2. Suppose \( Z \) is a standard normal random variable. Find the following using the standard normal table and show your work.
   (a) \( P(-1.28 < Z < 2.86) \)
   (b) \( P(1.45 < Z) \)
   (c) A number \( c \) such that \( P(Z < c) = 0.74 \)

3. Suppose scores on an English exam are normally distributed with a mean of 72.3 and a standard deviation of 8.2. Find the following using the standard normal table and show your work. You may check your work with your calculator.
   (a) The percentage of students scoring between 70 and 80.
   (b) The percentage of students scoring below 60.
   (c) The 90th percentile of the exam scores.

4. Suppose blood glucose levels in a certain population are normally distributed with mean 118 mg/100 mL and standard deviation 46 mg/100 mL. Find the following.
   (a) The percentage of the population with blood glucose levels between 85 mg/100 mL and 137 mg/100 mL.
   (b) The percentage of the population with blood glucose levels over 144 mg/100 mL.
   (c) The 60th percentile of blood glucose levels in this population.

5. A certain type of lottery ticket costs $1, the average prize is $0.55, and the standard deviation of the prizes is $2.25. If 100 of these tickets are bought, find the probability that the average prize for these 100 tickets is over $1.

6. In a random sample of 500 women from a certain country, the average height was 65.32 inches, and the standard deviation was 2.04 inches.
   (a) Find a 99\% confidence interval for the average height of women in this country.
   (b) Based on this confidence interval, are you confident that the average height of women in the country is over 65 inches?
7. A package of M&M’s contains 47.9 grams of candy, according to the information on the front of the package. Suppose the contents of five randomly selected packs of M&M’s were weighed, resulting in the following measurements: 47.28, 48.31, 47.21, 48.85, 46.37.

(a) Find a 95% confidence interval for the average mass of the contents of a package of M&M’s
(b) Based on this confidence interval, do you believe that the average mass of a package of M&M’s is greater than 47.9 grams?

8. In a random sample of 400 Texans, 165 approved of a certain political candidate.

(a) Find a 99% confidence interval for the proportion of Texans who approve of this candidate.
(b) Based on this confidence interval, do you believe that a majority of Texans support this candidate?

9. Suppose you would like to estimate the percentage of people in the population who have a newly discovered disease. What sample size would be required to obtain an estimate with an error of at most 2 percentage points and a confidence level of 95%?

1. (a) 0.969
   (b) 0.897
   (c) 0.979

2. (a) 0.8976
   (b) 0.0735
   (c) 0.64

3. (a) 0.4367
   (b) 0.0668
   (c) 82.80

4. (a) 0.4236
   (b) 0.2860
   (c) 129.65

5. 0.0228

6. (a) 65.32 ± 0.24 or (65.08, 65.56)
   (b) Yes

7. (a) 47.60 ± 1.22 or (46.38, 48.82)
   (b) We have insufficient evidence to answer this question.

8. (a) 0.413 ± 0.063 or (0.35, 0.476)
   (b) No, we are confident that a majority of Texans do not approve of this candidate.

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