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Assignment 7

Due: Friday November 20, 2020 11:59 PM (Atlantic Standard Time)

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Q1 (6 points)

Assume that the body temperature in a population has a normal distribution with mean 98.1°F and standard deviation 0.67°F .

- (a) What is the proportion of people whose body temperature is below 97.5°F ?
- (b) For a randomly selected person from this population, what is the probability that his or her body temperature is above 97.5°F ?
- (c) For a random sample of size $n = 9$, what is the probability that the sample mean is below 97.5°F ?

Q2 (6 points)

In Europe, 53% of flowers of the rewardless orchid, *Dactylorhiza sambucina*, are yellow, whereas the remaining flowers are purple (Gigord et al. 2001). For this problem, *use the normal approximation if it is appropriate to do so*.

- (a) If we took a random sample of a single individual from this population, what is the probability that it would be purple?
- (b) If we took a random sample of five individuals, what is the probability that at least three are yellow?
- (c) If we took a random sample of 263 individuals, what is the probability that no more than 150 are yellow?

Q3 (6 points)

In the Northern Hemisphere, dolphins swim predominantly in a counterclockwise direction while sleeping. A group of researchers wanted to know whether the same was true for dolphins in the Southern Hemisphere (Stafne and Manger, 2004). They watched eight sleeping dolphins and recorded the percentage of time that the dolphins swam clockwise. Assume that this is a random sample and that this variable has a normal distribution in the population. These data are as follows:

77.7, 84.8, 79.4, 84.0, 99.6, 93.6, 89.4, 97.2

- (a) What is the 95% confidence interval for the mean percentage of time swimming clockwise in the Southern Hemisphere dolphins?
- (b) What is the 99% confidence interval for the mean percentage of time swimming clockwise in the Southern Hemisphere dolphins?
- (c) What is the 95% confidence interval for the standard deviation of the percentage of time swimming clockwise in the Southern Hemisphere?

Q4 (4 points)

Without external cues such as the sun, people attempting to walk in a straight line tend to walk in circles. One idea is that most individuals have a tendency to turn in one direction because of internal physiological asymmetries, or because of differences between legs in length or strength. Souman et al. (2009) tested for a directional tendency by blindfolding 15 participants in a large field and asking them to walk in a straight line. The numbers below are the median change in direction (turning angle) of each of the 15 participants measured in degrees per second. A negative angle refers to a left turn, whereas a positive number indicates a right turn.

-5.19, -1.20, -0.50, -0.33, -0.15, -0.15, -0.15, -0.07, 0.02, 0.02, 0.28, 0.37, 0.45, 1.76, 2.80

- (a) Do people tend to turn in one direction (e.g., left) more on average than the other direction (e.g., right)? Test whether the mean angle differs from zero.
- (b) Based on your results, is the following statement justified? "People do not have a tendency to turn more in one direction, on average, than the other direction." Explain.