Stats Medic Ultimate Interpretations Practice

1. After a physical education class does the mile run, the teacher records the heart rates of his students and finds they have a mean of 105.3 bpm with a standard deviation of 7.2 bpm. Interpret the standard deviation in the context of the problem.

   The heart rate of a student in the physical education class after the mile run typically varies by 7.2 bpm from the mean of 105.3 bpm.

2. After completing a 5k marathon, Juan is told that his time has a z-score of z = 1.12. Interpret the z-score in the context of the problem.

   Juan's 5K marathon time is 1.12 standard deviations above the mean.

3. For a biology project, Ebise observes the relationship between the number of birds she sees (x) and the outdoor temperature (y). After analyzing the data, she finds that the variables have a correlation of $r = 0.43$. Interpret the correlation in the context of the problem.

   The linear association between number of birds Ebise sees and the outdoor temperature is moderate and positive.

4. The remaining height (in inches) of a candle burning for a certain number of hours can be modeled by $\widehat{height} = 9.06 - 0.37(hours)$. Interpret the slope and y-intercept of the regression equation in the context of the problem.

   slope: The predicted candle height decreases by 0.37 in for each additional hour burned.

   y-intercept: The predicted candle height when it has been burned for 0 hours is 9.06 in.

5. Over the course of the semester, Brian has built a model to predict his score on a test based on the number of hours he has put into studying. On his most recent test, Brian studied for 3 hours and the prediction using the model had a residual of -5.36 points. Interpret the residual in the context of the problem.

   The actual score on Brian's test was 5.36 points below the number predicted when Brian studied for 3 hours.

6. For a variety of vehicles, the pressure applied to the brake pedal (x) is recorded along with the distance it took to the vehicle to stop from 60 mph (y). For this model, technology gives $r^2 = 0.632$. Interpret the r^2 in the context of the problem.

About 63.2% of variation in the distance it took the vehicle to stop from 60 mph is explained by the linear relationship with pressure applied to the brake pedal.

7. A new coffee shop records the number of daily transactions for a random sample of 30 days. A 99% confidence interval for the mean number of transactions per day yields (174.36, 206.21). Interpret the confidence interval in the context of the problem.

We are 99% confident that the interval from 174.36 to 206.21 captures the true mean number of transactions per day at this coffee shop.

8. Stats Medic is interested in sponsoring the Grand Rapids Whitecaps AAA baseball team, but only if the average attendance for games last season is greater than 2,000. Lindsey decides to take a simple random sample of 30 games from last season. She will perform a test of:

$$H_0: \mu = 2000$$
$$H_a: \mu > 2000$$

where μ is the true mean number of people attending Whitecaps games last season. Interpret a Type I error and a Type II error in this setting.

Type I error: The mean attendance for games last season is actually 2000, but we find convincing evidence the mean attendance is greater than 2000.

Type II error: The mean attendance for games last season is actually greater than 2000, but we don't find convincing evidence that the mean attendance for games last season is greater than 2000.

9. The sample had a sample mean of $\bar{x} = 2298.4$ people. After conducting the significance test referenced in the previous problem at the $\alpha = 0.05$ level, Lindsey finds a p-value of 0.0231. Interpret the p-value in the context of the problem and give an appropriate conclusion for the significance test.

Assuming the mean attendance for games last season is 2000 ($H_0: \mu = 2000$) there is a 0.0231 probability of getting a sample mean of 2298.4 or more purely by chance.

Because the p-value $0.0231 < 0.05$, we do have convincing evidence the mean attendance for games last season is more than 2000 ($H_a: \mu > 2000$).