**Applying Covariance and Correlation to Interpret Results**

| **Directions** |
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* **30 sec - Read** through the directions in the handout.
* **10 min - Calculate** the covariance and the correlation coefficient ( r ) for the data. Use the formulas given in the [appendix](#nl3e8x7ggyr) section.
* **5 min - Interpret** the results and **discuss** answers to these questions given in the Your Task section.

| **Your Task** |
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You need to evaluate the relationship between the number of hours asleep and daily screen time using the data collected from a sample of 10 people. Using the covariance and the correlation coefficient values, you need to then interpret how strong the relationship is between the number of hours asleep and daily screen time.

| **Screen Time (Hours)** | **Sleep Hours** |
| --- | --- |
| 2 | 8 |
| 3 | 7.5 |
| 5 | 6 |
| 1 | 8.5 |
| 4 | 7 |
| 6 | 5.5 |
| 2.5 | 8 |
| 4.5 | 6.5 |
| 3 | 7 |
| 5.5 | 5.5 |

1. Calculate the **Covariance**.
2. Calculate the **Correlation Coefficient ( r ).**
3. **Interpret the results** using the questions below:
   1. *Covariance: is it positive, negative, or near zero? What does that suggest about the direction of the relationship between screen time and sleep?*
   2. *Correlation coefficient ( r ): Is it a strong or weak correlation? Positive or negative?*
   3. *What does the correlation value tell us about how screen time affects sleep?*
   4. *Does the direction (positive or negative) make sense given your personal experiences or common sense?*
   5. *How might this insight be used to improve sleep habits?*
4. Use this organiser to jot down the results.

| **Mean Values**   * Mean Screen Time: **\_\_\_\_\_\_\_\_\_ hours** * Mean Sleep Hours: **\_\_\_\_\_\_\_\_\_ hours**   **Covariance Calculation**   * Covariance: **\_\_\_\_\_\_\_\_** (rounded to two decimal places)   **Standard Deviations**   * Standard Deviation of Screen Time: **\_\_\_\_\_\_\_\_** * Standard Deviation of Sleep Hours: **\_\_\_\_\_\_\_\_** * Product of the SD values: **\_\_\_\_\_\_\_\_\_\_\_**   **Correlation Coefficient (r)**   * Correlation Coefficient: **\_\_\_\_\_\_\_\_\_\_\_**   **Interpretation**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
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| **Appendix** |
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**Step-by-Step Calculation of Covariance**:

1. Find the mean of both screen time and sleep hours.
2. Subtract the mean from each value in both sets.
3. Multiply the differences for each pair of values.
4. Add all the products and divide by the number of pairs (n-1 for a sample).

**Calculate the Correlation Coefficient:**

1. Calculate the standard deviation for screen time and sleep hours separately.
   1. Calculate the variance:
      1. Find the mean: Calculate the average of your data set.
      2. Subtract the mean: Find how much each data point differs from the mean.
      3. Square the differences: Square each of these differences to make them positive.
      4. Add and divide: Add up all the squared differences, then divide by the total number of values (or n-1 for a sample)
   2. Find the square root of the variance.
2. Divide the covariance by the product of the standard deviations to find the correlation coefficient.