**Activity 7.1.3 – Inference Problems on Correlation and Regression**

**Inference on Population Correlation Coefficients**

1. The following tables show the sodium content (in mg per serving) and rating for two random samples of breakfast cereals.

**Sample 1, *n* = 10**

|  |  |  |
| --- | --- | --- |
| Cereal | Sodium | Rating |
| Post Natural Raisin Bran | 200 | 37.84 |
| Golden Grahams | 280 | 23.80 |
| Double Chex | 190 | 44.33 |
| Wheaties | 200 | 51.59 |
| Frosted Flakes | 200 | 31.44 |
| Fruit Loops | 125 | 32.21 |
| Honey Nut Cheerios | 250 | 31.07 |
| Apple Cinnamon Cheerios | 180 | 29.51 |
| Fruit & Fiber Dates, Walnuts, and Oats | 160 | 40.92 |
| Corn Chex | 280 | 41.45 |

**Sample 2, *n* = 10**

|  |  |  |
| --- | --- | --- |
| Cereal | Sodium | Rating |
| Total Raisin Bran | 190 | 28.59 |
| Crispix | 220 | 46.90 |
| Honey-comb | 180 | 28.74 |
| Golden Crisp | 45 | 35.25 |
| Shredded Wheat | 0 | 68.24 |
| Maypo | 0 | 54.85 |
| Raisin Squares | 0 | 55.33 |
| Apple Cinnamon Cheerios | 180 | 29.51 |
| 100% Natural Bran | 15 | 33.98 |
| Cracklin' Oat Bran | 140 | 40.45 |

For each sample, complete the following steps:

1. Use technology to construct a scatterplot of the sample data.
2. Calculate and interpret the sample correlation coefficient.
3. State the assumed value for the population correlation coefficient to conduct a randomization test.
4. Construct a randomization distribution of sample correlation coefficients (using Statkey).
5. Find the probability of observing a sample correlation coefficient as extreme as the one found.
6. State whether the observed sample correlation coefficient is statistically significant.
7. State a conclusion about the population correlation coefficient.

**Inference on Population Regression Line Slopes**

1. The following table shows the number of cellular phone subscriptions in 2011 (per 100 people) and the average life expectancy in 2011 for a random sample of 10 countries.

**Random Sample of 10 Countries**

|  |  |  |
| --- | --- | --- |
| Country | Number of Cellular Subscriptions in 2011 | 2011 Life Expectancy (in years) |
| Spain | 114 | 82 |
| Brazil | 123 | 75 |
| Panama | 204 | 77 |
| Russia | 179 | 69 |
| Romania | 109 | 75 |
| Angola | 48 | 66 |
| Ethiopia | 17 | 62 |
| Mongolia | 105 | 64 |
| Nigeria | 59 | 59 |
| United States | 106 | 79 |

Complete the following steps:

1. Use technology to construct a scatterplot of the sample data.
2. Calculate the slope and *y*-intercept of the least-squares regression line.
3. State the assumed value for the population regression line slope to conduct a randomization test.
4. Construct a randomization distribution of sample regression lines slopes (using Statkey).
5. Find the probability of observing a sample regression line slope as extreme as the one found.
6. State whether the observed sample regression line slope is statistically significant.
7. State a conclusion about the population regression line slope.