**Chi-Squared and Regression**

A pharmaceutical company develops a new drug that helps obese patients who are not currently diabetic avoid contraction of diabetes. The conduct conducts a trial splitting a sample of 135 patients into two groups, a drug group and a placebo group. They then monitored the patients for 5 years and noted how many patients in each group contracted diabetes. The company wants to conduct a Chi-Squared test for Independence to assess whether their new drug has any effect on the contraction of diabetes amongst obese patients. Use this data to answer questions 1-3.

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| --- | --- | --- |
| Number of Patients | Drug | Placebo |
| Contracted diabetes | 51 | 18 |
| Did not contract diabetes | 39 | 27 |

1. Identify the correct critical value, $χ\_{α,df}^{2}$.
2. Calculate the test statistic, $χ\_{test}^{2}$.
3. The company statistician tells you that the p-value of the test is 0.0678. Compare the test statistic to the critical value. Compare the p-value to alpha. Is there statistically significant evidence to suggest that the drug is effective in preventing the contraction of diabetes? Explain why or why not.

An occupational therapist hypothesizes that there is a linear relationship between the number of years her patients spent in a desk job and the number of weeks it takes to complete therapy. The following table contains data from a sample of nine of her patients. Use this data to answer questions 4-6.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | A | B | C | D | E | F | G | H | I | J |
| Desk Job Yrs (j) | 29.9 | 20 | 14.2 | 20.6 | 12.1 | 23.4 | 25.4 | 24.7 | 13.2 | 27.6 |
| Therapy Wks (t) | 12 | 8 | 6 | 7 | 5 | 11 | 9 | 11 | 5 | 12 |

1. Calculate and interpret the pearson’s correlation coefficient between the variables J and T, $r\_{jt}$, and the coefficient of determination between the variables J and T, $r\_{jt}^{2}$. (20%)
2. Determine the coefficients of the least squares regression line for the following model between years in a desk job and weeks in therapy (equations on p.487): $t\_{i}=a+b\*j\_{i}+ε\_{i}$ (20%)
3. Use the least-squares regression line to predict the expected number of weeks of therapy needed for a patient who has spent 22.5 years in a desk job. (20%)