Assignment 2 - Inferences about Two Samples

INSTRUCTIONS

This is an independent assignment and is to be completed alone. ALL questions should have a written final answer. Response should be one or two sentences long and should describe what your results tell us about the question (e.g. don't just tell me whether the null hypothesis was rejected or not – tell me what it means in the context of this question). You may write with pencil and paper or type your solutions. Make sure solutions are nice and neat. *When you are finished, submit this assignment online in the "Assignment 2" dropbox on iLearn under our MGT204 Statistical Analysis Course.*

1. Are the Radiation effects the same for men and women? Among 2,739 female atom bomb survivors, 1,397 developed thyroid diseases. Among 1,352 male atom bomb survivors, 436 developed thyroid diseases. Use a 0.01 significance level to test the claim that the female survivors and male survivors have different rates of thyroid diseases.

    a) State the Null and Alternative Hypotheses and define which variable is represented by μ_1 and μ_2. [*2 marks*]

    b) State which test statistic we should use. (Don't worry about verifying that we've met all the requirements to use that test statistic – just assume we can). [*1 mark*]

    c) What are the critical value(s)? Sketch a graph and label the critical points. [*2 mark*]

    d) Calculate the calculated test statistic. [*2 mark*]

    e) Do we reject the null hypothesis? Why or why not? Explain. [*2 marks*]

    f) In the context of this question, what does our answer to part e mean? (For example, if we reject the null hypothesis, what does this mean about the daily travel expenses?) [*2 marks*]

2. Scientists collect a simple random sample of 25 menthol cigarettes and 25 nonmenthol cigarettes. Both samples consist of cigarettes that are filtered, 100 mm long and non-light. The menthol cigarettes have a mean nicotine amount of 0.87 mg and a standard deviation of 0.24 mg. The nonmenthol cigarettes have a mean nicotine amount of 0.92 mg and a standard deviation of 0.25 mg. Use a 0.05 significance level to test the claim that menthol cigarettes and nonmenthol cigarettes have different amounts of nicotine. Does menthol appear to have an effect on the nicotine content?

a) State the Null and Alternative Hypotheses and define which variable is represented by μ_1 and μ_2. [*2 marks*]

b) State which test statistic we should use. (Don't worry about verifying that we've met all the requirements to use that test statistic – just assume we can). [*1 mark*]

c) What are the critical value(s)? Sketch a graph and label the critical points. [*2 mark*]

d) Calculate the calculated test statistic. [*2 mark*]

e) Do we reject the null hypothesis? Why or why not? Explain. [*2 marks*]

f) In the context of this question, what does our answer to part e mean? (For example, if we reject the null hypothesis, what does this mean about the daily travel expenses?) [*2 marks*]

3. Does your body temperature change during the day? Listed below are body temperatures (in °F) of subjects measured at 8:00 am and at 12:00 am. Construct a 95% confidence interval estimate of the difference between the 8:00 am temperatures and the 12:00 am temperatures. Is body temperature basically the same at both times?

| 8:00 am | 97.0 | 96.2 | 97.6 | 96.4 | 97.8 | 99.2 |
| 12:00 am | 98.0 | 98.6 | 98.8 | 98.0 | 98.6 | 97.6 |

a) Calculate the value of the margin of the error E. [4 marks]

b) Construct the confidence interval. [3 marks]

c) Interpret the results found in part b. [2 marks]

d) In the context of this question, what does our answer to part c mean? What does this mean about the body temperature? [*1 marks*]