CENG 3516 STATISTICAL COMPUTING

QUIZ-1

1. One way to measure a person’s fitness is to measure their body fat percentage. Average body fat percentages vary by age, but according to some guidelines, the normal range for men is 15-20% body fat, and the normal range for women is 20-25% body fat.

Our sample data is from a group of men and women who did workouts at a gym three times a week for a year. Then, their trainer measured the body fat and wonders whether the body fat is the same for men and women. The table below shows the data.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Men | 1 | 8 | 14 | 13 | 20 | 24 | 16 | 7 | 6 | 19 |
| Women | 5 | 7 | 22 | 21 | 23 | 28 | 16 | 6 | 12 | 23 |

1. Build histograms and boxplots for each group. Comment about the distribution and the outliers.
2. Write down a hypothesis to test if gender affects the amount of body fat.
3. Decide whether this is an independent or dependent two sample test.
4. Check normality assumption/ assumptions needed.
5. Test your hypothesis. (α=0.05)
6. Comment:
7. Write down a hypothesis to test if being a women means “the person is more likely to have more body fat”.
8. Test your hypothesis. (α=0.05)
9. Comment:
10. Find the confidence intervals of mean body fat for men and women separately and compare them. (α=0.05)
11. The same data, but totally different scenario: Lets say the below table corresponds to the “%body fat of 10 people”, which are measured at the time they started doing sports for 3 times a week; and after 3 months.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| After 3 months | 1 | 8 | 14 | 13 | 20 | 24 | 16 | 7 | 6 | 19 |
| Start day | 5 | 7 | 22 | 21 | 23 | 28 | 16 | 6 | 12 | 23 |

1. Write down a hypothesis to test if doing sports decreases the amount of body fat.
2. Decide whether this is an independent or dependent two sample test.
3. Check normality assumption/assumptions.
4. Test your hypothesis. (α=0.05)
5. Comment:
6. Another scenario: Lets say the below table corresponds to the “muscle gain of 30 people who started doing sports 6 months ago”: 1st group did sports once a week, 2nd group did sports three times a week, 3rd group did sports five times a week.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Group 1 | 1 | 3 | 6 | 5 | 7 | 2 | 1 | 2 | 3 | 5 |
| Group 2 | 9 | 7 | 7 | 4 | 3 | 6 | 5 | 4 | 6 | 7 |
| Group 3 | 6 | 8 | 7 | 7 | 9 | 5 | 7 | 8 | 6 | 7 |

1. Write down a hypothesis to test if these groups have equal means or not. (α=0.05)
2. Comment:
3. Implement TukeyHSD test and compare the groups. (α=0.05)
4. Comment: