Hand in Exercises 11.16, 11.17, 11.26

11.16(a)

gen BMIDIFF = BMI3-BMI1

browse //11.16(a)

BMIDIFF(ID=1) = 0.64

11.16(b)

graph box BMIDIFF, over(SEX) //11.16(b)



According to the box plot, the distributions of men and women are both approximately symmetric. The distribution of women is more discrete than men considering the spread of the outliers. According to the median, men appear to show a decrease while women demonstrate an increase in BMI.

11.16(c)

summarize BMIDIFF, detail //11.16(c)

The n of BMIDIFF = 304 > 30, so the t-test is robust to violations of the normality assumption of this test.

11.16(d)

robvar BMIDIFF, by (SEX) //11.16(d)

output:

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According to the Leven’s test, W0 = 1.9595529, p > 0.05, so the variances are equal.

11.16(e)

ttest BMIDIFF, by (SEX) //11.16(e)

Output:

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According to t = -2.5687, and p = 0.0107 (Ha: diff != 0), we can conclude that the change in body mass index for women(Mean = 0.4976, SD = 2.342217) is statistically significantly different from that for men(Mean = -0.1345, SD = 1.910659). The body mass index for women is increasing while the body mass index for men is decreasing.

11.16(f)

According to the Cohen’s d = 0.294, suggesting a small to medium effect size.

11.17(a)

by BPMEDS3, sort: summarize SYSBP3, detail

gen SYSBPskew = SYSBP3 if BPMEDS3 != .

summskew SYSBPskew //11.17(a)

Since there are only 27 participants in the group of currently taking anti-hypertensive medication, the tenability of the normality assumption needs to be evaluated.

Output:

. summskew SYSBPskew

skewness = 0.662; seskew = 0.152 ; skewness ratio = 4.365

Since skewness ratio > 2, the normality of the group of currently taking anti-hypertensive medication is not tenable

11.17(b)

gen SYSBP3lg = log10(SYSBP3)

summskew SYSBP3lg, by(BPMEDS3) //11.17(b)

Output:

手机屏幕截图

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Skewness ratio of both group before the log transformation:

截图里有图片

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The log transformation is effective since significantly reduced the skewness ration of both group.

11.17(c)

robvar (SYSBP3lg), by (BPMEDS3)

ttest (SYSBP3lg), by (BPMEDS3) //11.17(c)

the result of the Leven’s test (w0 = 3.5786, p > 0.05) indicates that the variances are equal.

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According to the results of the independent t-test, the mean of the average systolic blood pressure in the group of those who were taking anti-hypertensive medication at time 3 is statistically significantly different from those who don’t (t = -5.2, p < 0.01).

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11.17(d) No. Because we do not know the participants’ blood pressure in time 1. So we cannot conclude that the difference between blood pressure is solely caused by anti-hypertensive medication.

11.26 (a)

Because each 8th grade science achievement score is paired with the 12th grade science achievement score of the exact same person.

11.26 (b)

Since there’re 497 (> 30) observations included in this data set, the paired-sample t-test is robust to violations of the normality assumption of this test.

11.26 (c)

H0: μachsci08 = μachsci12 H1: μachsci08 != μachsci12

11.26 (d)

ttest achsci08 == achsci12

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*p* = 0.745

11.26 (e)

95% confidence interval for the mean difference = (-0.7565, 0.5413)

11.26 (f)

Because 0 is contained in the 95% confidence interval for the mean difference = (-0.7565, 0.5413), so we can say that the level of science achievement in 8th grade is not statistically significantly different from that in 12th grade.