Hi All,Please attempt the following questions for HW 9. It will be due on 4/25. Page 357: 10.31, 10.32, 10.33, 10.34, 10.35   Page 359: 10.44, 10.45

10.31 A manufacturer claims that the average tensile strength of thread A exceeds the average tensile strength of thread B by at least 12 kilograms. To test this claim, 50 pieces of each type of thread were tested under similar conditions. Type A thread had an average tensile strength of 86.7 kilograms with a standard deviation of 6.28 kilograms, while type B thread had an average tensile strength of 77.8 kilograms with a standard deviation of 5.61 kilograms. Test the manufacturer’s claim using a 0.05 level of significance.

ssp=[(n1-1)\*s1^2 + (n2-1)s2^2]/(n1+n2-2)

np=x1-x2-(u1-u2)/rad(ssp(1/n1 + 1/n2))

(86.7-77.8-(12))/rad((39.4384/50)+(31.4721/50))=-3.1/1.191=-2.6,

z(-2.6)=0047, or not very likely.

10.32 Amstat News (December 2004) lists median salaries for associate professors of statistics at research institutions and at liberal arts and other institutions in the United States. Assume that a sample of 200 associate professors from research institutions has an average salary of $70,750 per year with a standard deviation of $6000. Assume also that a sample of 200 associate professors from other types of institutions has an average salary of $65,200 with a standard deviation of $5000. Test the hypothesis that the mean salary for associate professors in research institutions is $2000higher than for those in other institutions. Use a 0.01 level of significance.

(70.75-65.2-2)/sqrt((36+25)/200)=3.55/rad(61/200)=6.4(>1.28), thus very likely.

10.33 A study was conducted to see if increasing the substrate concentration has an appreciable effect on the velocity of a chemical reaction. With a substrate concentration of 1.5 moles per liter, the reaction was run 15 times, with an average velocity of 7.5 micro moles per 30 minutes and a standard deviation of 1.5. With a substrate concentration of 2.0 moles per liter, 12 runs were made, yielding an average velocity of 8.8 micromoles per 30 minutes and a sample standard deviation of 1.2. Is there any reason to believe that this increase in substrate concentration causes an increase in the mean velocity of the reaction of more than 0.5 micromole per 30 minutes? Use a 0.01 level of significance and assume the populations to be approximately normally distributed with equal variances.

1.5moles/liter, 15 times, 7.5mm/30min, sd=1.5

2moles/liter, 12 times, 8.8mm/30min, sd=1.2 ; sig=.01, du=.4mm/30min.

(8.8-7.5-.5)/sqrt(2.25(1.5)/15+1.44(2)/12)=.8/.5147815=1.55417(>t(26,01), thus H0.

10.34 A study was made to determine if the subject matter in a physics course is better understood when a lab constitutes part of the course. Students were randomly selected to participate in either a 3-semesterhour course without labs or a 4-semester-hour course with labs. In the section with labs, 11 students made an average grade of 85 with a standard deviation of 4.7, and in the section without labs, 17 students made an average grade of 79 with a standard deviation of 6.1.Would you say that the laboratory course increases the average grade by as much as 8 points? Use a P-value in your conclusion and assume the populations to be approximately normally distributed with equal variances.

85-79-8/rad((22.09/11)+(37.21/17))=-2/2.04566=-.976

(85-77-8)/5.6rad((1/11)+(1/17))=-2/2.167=-.1382.

-.1382>-.976, favour h0.

10.35 To find out whether a new serum will arrest leukemia, 9 mice, all with an advanced stage of the disease, are selected. Five mice receive the treatment and 4 do not. Survival times, in years, from the time the experiment commenced are as follows:

Treatment 2.1 5.3 1.4 4.6 0.9

No Treatment 1.9 0.5 2.8 3.1

At the 0.05 level of significance, can the serum be said to be effective? Assume the two populations to be normally distributed with equal variances.

T(9,.05)=1.86; (2.86-2.075-0)((3.883/5)+(1.3625/4))^(1/2).

.785/rad(.7766+.340625)=.785/1.057=.74267

Since 1.86>.74267, The treatment is not very effective.

10.44 In a study conducted by the Department of Human Nutrition and Foods at Virginia Tech, the following data were recorded on sorbic acid residuals, in parts per million, in ham immediately after dipping in a sorbate solution and after 60 days of storage: Sorbic Acid Residuals in HamSlice

Before Storage After Storage

1 224 116

2 270  96

3 400 239

4 444 329

5 500 437

6 660 597

7 1400689

8 680 576

Assuming the populations to be normally distributed, is there sufficient evidence, at the 0.05 level of significance, to say that the length of storage influences sorbic acid residual concentrations?

(572.25-384.875-0)/((13850.2+50942.7)/8)^(1/2)=187.375/90=2.082.

T(7,.05)=1.895, Length of time contributes to sorbic acid residual concentrations.

10.45 A taxi company manager is trying to decide whether the use of radial tires instead of regularbelted tires improves fuel economy. Twelve cars were equipped with radial tires and driven over a prescribed test course. Without changing drivers, the same cars were then equipped with regular belted tires and driven once again over the test course. The gasoline consumption, in kilometers per liter, was recorded as follows: Kilometers per LiterCar

Radial Tires Belted Tires

1 4.2 4.1

2 4.7 4.9

3 6.6 6.2

4 7.0 6.9

5 6.7 6.8

6 4.5 4.4

7 5.7 5.7

8 6.0 5.8

9 7.4 6.9

10 4.9 4.7

11 6.1 6.0

12 5.2 4.9

Can we conclude that cars equipped with radial tires give better fuel economy than those equipped with belted tires? Assume the populations to be normally distributed. Use a P-value in your conclusion.

(5.75-5.6-0)/((1.11/12)+(.98/12))^(1/2)=.14/.417=.3357. T(.3357,12)=N/A.

Since the mean conservation of fuel was higher in radial tires, even given standard deviations, radial tires would be preferred before more test drives. (+ I used r. (:)))

CallBack:

Version:1.0 StartHTML:0000000107 EndHTML:0000005987 StartFragment:0000000127 EndFragment:0000005969

> setwd("~/Downloads")Error in setwd("~/Downloads") : cannot change working directory> setwd("://Downloads")> myData=read.csv("hw.csv")> read(myData)Error in read(myData) : could not find function "read"> view(myData)Error in view(myData) : could not find function "view"> attach(myData)> read(myData)Error in read(myData) : could not find function "read"> view(myData)Error in view(myData) : could not find function "view"> myData Radial.Tires Belted.Tires Before.Storage After.Storage Treated Untreated

1 4.2 4.1 224 116 2.1 1.9

2 4.7 4.9 270 96 5.3 0.5

3 6.6 6.2 400 239 1.4 2.8

4 7.0 6.9 444 329 4.6 3.1

5 6.7 6.8 500 437 0.9 NA

6 4.5 4.4 660 597 NA NA

7 5.7 5.7 1400 689 NA NA

8 6.0 5.8 680 576 NA NA

9 7.4 6.9 NA NA NA NA

10 4.9 4.7 NA NA NA NA

11 6.1 6.0 NA NA NA NA

12 5.2 4.9 NA NA NA NA> mean(myData)[1] NAWarning message:In mean.default(myData) : argument is not numeric or logical: returning NA> mean(Radial.Tires)[1] 5.75> sd(Radial.Tires)[1] 1.052702> mean(Belted.Tires)[1] 5.608333> sd(Belted.Tires)[1] 0.9940352> var(Radial.Tires)[1] 1.108182> var(Belted.Tires)[1] 0.9881061

Version:1.0 StartHTML:0000000107 EndHTML:0000003670 StartFragment:0000000127 EndFragment:0000003652

> mean(Before.Storage)[1] NA> na.rm=T> mean(Before.Storage)[1] NA> na.rm=TRUE> > mean(Before.Storage)[1] NA> mean(Before.Storage, na.rm=T)[1] 572.25> var(Before.Storage, na.rm=T)[1] 138350.2> mean(After.Storage, na.rm=T)[1] 384.875> var(After.Storage, na.rm=T)[1] 50982.7> mean(Treated, na.rm=T)[1] 2.86> var(Treated, na.rm=T)[1] 3.883> mean(Untreated, na.rm=T)[1] 2.075> var(Untreated, na.rm=T)[1] 1.3625

Hi all,

For the extra credit assignment please attempt the following questions. It will be due on 5/10.

Page 382: 10.79, 10.80, 10.81, 10.86

10.79 A machine is supposed to mix peanuts, hazelnuts, cashews, and pecans in the ratio 5:2:2:1. A

can containing 500 of these mixed nuts was found to have 269 peanuts, 112 hazelnuts, 74 cashews, and

45 pecans. At the 0.05 level of significance, test the hypothesis that the machine is mixing the

nuts in the ratio 5:2:2:1.

5, 2, 2, 1;10

1/2,1/5,1/5,1/10;1

250,100,100,50;500

269,112,74, 45;500

19, 12, 26, 5;62

Machine is off by an average of 15.5 nuts.

cx=7.815: tx= ((19-15.5)^2 + (15.5-12)^2 + (26-15.5)^2 + (15.5-5)^2)/15.5

= (3.5^2 + 3.5^2 + 10.5^2 + 10.5^2)/15.5 = (24.5+220.5)/15.5 = 245/15.5=15.806

This is obviously not a normal distribution.

10.80 The grades in a statistics course for a particular semester were as follows:

Test the hypothesis, at the 0.05 level of significance, that the distribution of grades is uniform.

Grade A, B, C, D, F

f 14,18,32,20,16;100

d 20,20,20,20,20;100

e 6, 2,12, 0, 4;24;5.08

cx=(4,.05)=9.488

tx=(.8464+9.4864+50.1264+25.8064+1.1664)/5.08=17.21

This data set is not normally distributed.

10.81 A die is tossed 180 times with the following results:

Is this a balanced die? Use a 0.01 level of significance.

t=01,02,03,04,05,06

f=28,36,36,30,27,23;180

d=30,30,30,30,30,30;180

e=2, 6, 6, 0, 3, 7 ;24

p=4, 4, 4, 4, 4, 4 ;24

cx=(5,.01)=15.086

tx=(4+4+4+16+1+9)/4=38/4=9.5.

We can say that this is a balanced die since tx<cx.

10.86 In an experiment to study the dependence of hypertension on smoking habits, the following data

were taken on 180 individuals: Test the hypothesis that the presence or absence of hypertension is

independent of smoking habits. Use a 0.05 level of significance.

21 36 30 87

48 26 19 93

69 62 49 180

33.35 30 23.68 87

35.65 32 25.32 93

69 62 49 180

4.57 1.2 1.7 0

4.28 1.1 1.6 0

0 0 0 0

4.57+2.28+1.2+1.1+1.7+1.6=14.5

cx=(2,.05)=5.991

tx= 14.5

We can assume from this data that the presence of hypertension is independent of smoking habits.

Page 383: 10.88, 10.89

10.88 A random sample of 200 married men, all retired, was classified according to education and

number of children: Test the hypothesis, at the 0.05 level of significance, that the size of a

family is independent of the level of education attained by the father.

14 37 32 83

19 42 17 78

12 17 10 39

45 96 59 200

18.675 39.84 24.485 0

17.55 37.44 23.01 0

8.755 18.72 11.505 0

0 0 0 0

1.216 .2 2.31 0

.12 .555 1.57 0

1.2 .16 .2 0

0 0 0 0

tx = E Not Zero = 7.531

cx=(4,.05)=9.488

10.89

Stack Overflow.

# Children seems to depend on father education.

Kind Regards,

Professor Paolino