1 Test on testing the hypotheses

1.1 Example

At the motorway with recommended speed 80 km/h we monitored the speeds of passing cars and obtained data (in km/h)

{89 93 78 82 76 95 83 89 94 72 89 87 81 85 76}

On the level 0.05 test the hypothesis H0 that

a) the average speed is 80 km/h,

b) the average speed less than 80 km/h,

c) the average speed greater than 80 km/h.

Results

a) pv=0.025; b) pv=0.012; c) pv=0.988

1.2 Example

The accuracy of setting of certain machine can be verified according to the variance of its products. If the variance is greater then the level 80, it is necessary to perform new setting. The following data sample has been measured

x = {258 215 225 229 235 228 231 225 242 222}

On the level 0.05 test if it is necessary to set the machine.

Results

pv=0.065

1.3 Example

Consumption of cars is measured by two methods A and B. The same car has been subdued to measuring by both methods. The results are

A = {4.3 6.2 6.8 6.7 5.1 5.0}

B = {4.8 5.3 5.2 5.8 5.3 5.9}

On the level 0.05 test equality of both methods if the variability of methods is assumed to be equal, if the consumption is assumed to be normally distributed.

Results

pv=0.53

1.4 Example

We are going to test if the lights on left and right spotlights of cars have equal settings. The measured values (above the correct angle) are

xL= {4.6 2.2 2.5 -4.6 2.8 0.1}

xP= {3.2 -1.5 1.1 -4.8 3.5 -0.2}

Test at the level 0.05 on normality assumption.

Results

pv=0.152

1.5 Example

We are going to test if the right spotlights are higher then left ones. The measured values (above the correct angle) are

xL= {4.6 2.2 2.5 -4.6 2.8 0.1}

xR= {3.2 -1.5 1.1 -4.8 3.5 -0.2}

Test at the level 0.05 on normality assumption.

Results

pv=0.076

1.6 Example

At the motorway with recommended speed 80 km/h speeds of passing cars have been monitored the in the direction to the town (xT) and from the town (xF). The data measured are

xT = {86 86 78 77 82 75 79 82 97 88}

xF = {79 76 80 82 84 78 75 81 75 77}

At the level 0.05 test the hypothesis H0: From the town the cars go faster. The variances are supposed to be different.

Results

pv=0.042

1.7 Example

We monitor speeds of three race cars. Randomly, we measured their speeds and got the following data

x1= {231 158 223 197 185 194}

x2= {185 163 238 199 221 236}

x3= {241 222 231 195 187 201}

x4= {254 267 241 224 178 200}

At the level 0.05 test the equality of the average speeds of the cars. The variances are assumed to be equal.

Results

pv=0.358

1.8 Example

From two classes 1 and 2 several children were tested how long they need to solve an example from math. The following data (in minutes) have been measured

x1={8 4 9 6 4 8 7 9 4 7 9 6 9 3}

x2={5 4 5 9 4 4 3 7 6 4 6 4 8 4 4 3 7 7 4 5 3}

The populations from which the data have been measured cannot be assumed normal. On the level 0.05 test if in both classes the children compute with equal speed.

Results

pv=0.037

1.9 Example

A connection between weight and height at children has been investigated. The following data sample has been obtained (frequencies of combinations of both these features)

weight (kg) \ height (m)	less than 1.2	between 1.2 and 1.5	more than 1.5
less than 12	59	42	43
between 20 and 30	44	59	45
more than 30	42	49	31

At the level 0.05 test the hypothesis that the color of eyes and hair are independent.

Results

pv=0.173.

1.10 Example

Tree supervisors are evaluating functionality of five fast tea services. Each inspector evaluates each service with marks 1,2,..,10 (10 being the best one). Test if the quality of the services is equal. The data are in the table

supervisor \ service	1	2	3	4	5
1	6	8	4	8	9
2	6	4	5	6	7
3	7	8	5	7	9

Results

pv=0.067.