

3) 1,2 1,3 1,5 1,7 1,3 1,2 1,8 1,9 1,4 1,2 1,8 1,5 1,3 1,4 1,1

1) Koşulların test o serimlerin popülasyon parametreleri kad y standartlara deviyayca pozitif  
 $H_0: \mu = 1,3$   $H_1: \mu > 1,3$

1) Kazanım parametresi

$\bar{X} = \frac{15}{15} = 1,44$   
 $\mu = 1,3$

$n = 15$   
 $s = 0,15$

2) Test istatistika

$Z = \frac{1,44 - 1,3}{0,15} \cdot \sqrt{15} = 0,28 \cdot 3,87 = 1,08$

3) Kritik değeri

$Z_{0,03} = 1,93$

$Z < Z_{0,03}$  Fikratan  $H_0$

4) ~~Podgorica~~ Podgorica

Podgorica	150	45%
Podgorica	150	49%

Podgorica	150	49%
Badva	100	45%

1) Koşulların test o serimlerin popülasyon parametreleri kad y standartlara deviyayca pozitif  
 $H_0: p_1 = p_2$   $H_1: p_1 > p_2$

$n_1 = 150$   
 $n_2 = 100$   
 $p_1 = 0,49$   
 $p_2 = 0,45$

1) Kazanım parametresi

$\hat{p} = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} = \frac{118,5 + 45}{250} = 0,65$

2) Test istatistika

$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{0,65 - 0,45}{\sqrt{\frac{0,45(1-0,45)}{250}}} = \frac{0,20}{\sqrt{\frac{0,2475}{250}}} = \frac{0,20}{\sqrt{0,00099}} = \frac{0,20}{0,0315} = 6,35$

3) Kritik değeri

$Z_{0,02} = 2,12$

$Z > Z_{0,02}$  Odbacım  $H_0!$

15/15

10/110

Kıyacı Kavgana  
24/22



3.13

deviacya 0,5m

1.2 1.3 1.5 1.7 1.9  
1.3 1.4 1.1

Prav zmagynost 0.03

$$\sigma = \frac{s}{\sqrt{n}} = \frac{0.5}{\sqrt{15}}$$

$$\bar{x} = \frac{15}{20.6} = 1.37$$

$$V = \frac{(1.02 - 1.37)^2}{2} = 0.03$$

n-1

1.2 1.8 1.9 1.4 1.2 1.8 1.5

Dawna kolic'



0,02

odbornost  $Z > \sqrt{0,2291} = 0,4784$  ?

1115

$$= \frac{0,34}{0,34} \cdot \frac{0,4}{1} = \frac{0,136}{0,34} = 0,4$$

$$Z = \frac{\sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}}{\sqrt{\frac{p(1-p)}{n}}} = \frac{\sqrt{\frac{0,34(1-0,34)}{118,6} + \frac{0,16(1-0,16)}{45}}}{\sqrt{\frac{0,34(1-0,34)}{250}}}$$

$$\sqrt{p_1} = 118,6$$

$$\sqrt{p} = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} = \frac{118,6 + 45}{250}$$

$$H_0: p_1 = p_2$$

$$H_1: p_1 \neq p_2$$

$\alpha = 0,02$

150 ucenika by  
0,29  
0,29

100 ucenika bude  
0,45  
0,45

4. Vpraskanje se pojavilo 4.

Davina Kodic



Group B

(3)

$\mu = 1.3$

$\sigma = 0.5$

$n = 15$

(1) exchange parameters

$\bar{X} =$

$1.2 + 1.3 + 1.5 + 1.7 + 1.3 + 1.2 + 1.8 + 1.9 + 1.4 + 1.2 + 1.8 + 1.5 + 1.3 + 1.4 + 1.1$

$H_0: \mu = 1.3$

$H_1: \mu \neq 1.3$

$\bar{X} = 1.44$

(2) test statistics

$Z = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}}$

$Z = \frac{1.44 - 1.3}{\frac{0.5}{\sqrt{15}}}$

$Z = 0.128 \cdot 3.188 = 1.105$

(3) kritische wert

$Z_{0.02} = 2.1$

~~$Z = 2.02$~~

(2) test statistics  $T = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}}$

$T = \frac{1.44 - 1.3}{\frac{0.5}{\sqrt{15}}} = 1.105$

9/101

ITI

(3)  $t_{0.03}(14) = 2.0$

$S = \sqrt{V} = 0.48$

$= 0.23$

$+ \frac{1.4 - 1.44}{\sqrt{15 - 1}} = \frac{0.04}{\sqrt{14}}$

$+ \frac{1.3 - 1.44}{\sqrt{15 - 1}} = \frac{-0.14}{\sqrt{14}}$

$+ \frac{1.5 - 1.44}{\sqrt{15 - 1}} = \frac{0.06}{\sqrt{14}}$

$+ \frac{1.7 - 1.44}{\sqrt{15 - 1}} = \frac{0.26}{\sqrt{14}}$

$+ \frac{1.3 - 1.44}{\sqrt{15 - 1}} = \frac{-0.14}{\sqrt{14}}$

$V = \frac{1}{15} \left[ \frac{0.04^2}{14} + \frac{(-0.14)^2}{14} + \frac{0.06^2}{14} + \frac{0.26^2}{14} + \frac{(-0.14)^2}{14} \right]$

in kategorie



Andrea Komerc 2/22

- (4) 150 učenika 9% ± 9%  
 100 učenika 8% ± 5%
- preglednost 20.02

H<sub>0</sub>: p<sub>1</sub> = p<sub>2</sub> ! H<sub>1</sub>: p<sub>1</sub> > p<sub>2</sub>

(1) računanje parametara

$$\hat{p} = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} = \frac{150 \cdot 0,09 + 100 \cdot 0,08}{150 + 100} = \frac{13,5 + 8}{250} = 0,086$$

(2) test statistika

$$Z = \frac{p_1 - p_2}{\sqrt{\hat{p} \cdot (1 - \hat{p})}} \cdot \sqrt{\frac{n_1}{n_1 + n_2} + \frac{n_2}{n_1 + n_2}} = \frac{0,09 - 0,08}{\sqrt{0,086 \cdot (1 - 0,086)}} \cdot \sqrt{\frac{150}{250} + \frac{100}{250}}$$

$$= \frac{0,01}{\sqrt{0,078}} \cdot \sqrt{1,2} = \frac{0,01}{0,279} \cdot 1,095 = 0,357$$

15/15

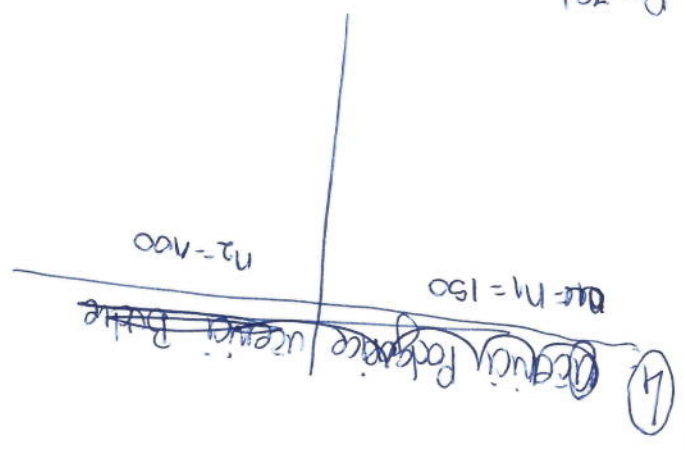
✓

odbacujemo H<sub>0</sub>

(3) kritična vrednost  
 $Z_{0,02} = 2,01 < Z$



дзавіц Мараля 31/22  
 Б група 1 Білграс



$p_1 = 79\%$

$p_2 = 45\%$

праг. значэнне:  $0,02$

$H_0: p_1 = p_2$  !  $H_1: p_1 \neq p_2$

$n = 250$

$p = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

$= \frac{150 \cdot 0,79 + 100 \cdot 0,45}{100 + 150}$

$= \frac{181,5 + 45}{250} = 0,964$

$Z = \frac{\sqrt{p \cdot (1-p)} \cdot (p_1 - p_2)}{\sqrt{\frac{p_1 \cdot (1-p_1)}{n_1} + \frac{p_2 \cdot (1-p_2)}{n_2}}}$

$= \frac{\sqrt{0,964 \cdot (1-0,964)} \cdot (0,79 - 0,45)}{\sqrt{\frac{0,79 \cdot 0,21}{150} + \frac{0,45 \cdot 0,55}{100}}}$

$= \frac{0,031 \cdot 0,34}{0,0131} = 0,810$

$|Z| = 0,810 < 2,02 = |Z_{0,02}|$

10/15

$Z_{0,02} = 2,02$

$|Z| = 5,41$

3) ~~Ho:  $\mu = 1.3$  ; H1:  $\mu > 1.3$~~

Ho:  $\mu = 1.3$  ; H1:  $\mu > 1.3$

$$\bar{X} = \frac{1.0 + 1.3 + 1.5 + 1.7 + 1.5 + 1.7 + 1.3 + 1.5 + 1.9 + 1.8 + 1.2 + 1.2 + 1.4 + 1.1 + 1.5 + 1.3 + 1.4 + 1.1}{15}$$

$$\bar{X} = \frac{21.6}{15}$$

$$|\bar{X} = 1.52$$

ke koba, in am b, ali mpy proporsio

$$\sqrt{\frac{(1.2-1.5)^2 + (1.3-1.5)^2 + (1.5-1.5)^2 + (1.7-1.5)^2 + (1.5-1.5)^2 + (1.7-1.5)^2 + (1.3-1.5)^2 + (1.5-1.5)^2 + (1.9-1.5)^2 + (1.8-1.5)^2 + (1.2-1.5)^2 + (1.2-1.5)^2 + (1.4-1.5)^2 + (1.1-1.5)^2 + (1.5-1.5)^2 + (1.3-1.5)^2 + (1.4-1.5)^2}{15-1}}$$

$$= \frac{-0.16 + (-0.14) + 0 + 0.04 + (-0.04) + (-0.04) + (-0.06) + 0.09 + 0.16 + (-0.2) + (-0.2) + 0.09 + 0.16 + (-0.2) + (-0.2) + (-0.2) + (-0.2)}{14}$$

$$(-0.8) = \sqrt{0.8}$$

$n = 15$

$S = \sqrt{V} = \sqrt{0.23} = 0.48$

$T = \frac{\bar{X} - \mu}{S} \cdot \sqrt{n}$

$T = \frac{1.5 - 1.3}{0.48} \cdot \sqrt{15}$

$T = 0.42 \cdot 3.87$

$T = 1.63$

$T > 0.103$  to  $0.03(14) = ?$

8/10

B grupa

3 1 4 zadatke

3)  $\alpha = 0,05$

Test 2)  $\sigma$  ocekivaniyu normaline raspodelyete populacijoje kada nauje poznata standardna devijacija

$H_0: \mu = 4,3$   $H_1: \mu > 4,3$

1) Parametri  
 $n = 15$   
 $\sigma = 0,5$

$\bar{x} = \frac{\sum x}{n}$   
 $\bar{x} = \frac{21,6}{15}$   
 $\bar{x} = 1,44$

W

2) Test stat

$$Z = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{1,44 - 4,3}{\frac{0,5}{\sqrt{15}}}$$

$$Z = \frac{0,5}{0,14} \cdot 3,87$$

$$Z = 0,25 \cdot 3,87$$

W  $Z = 1,08$

Podaci:

1,2	1,3	1,5	1,7	1,3	1,2	1,8	1,5	1,4	1,4
1,2	1,2	1,8	1,5	1,3	1,4	1,4	1,4	1,4	1,4

$\sum x = 21,6$

3) Kritična vrednost  $Z_{0,03} = 1,98$  endno?  $Z_{1,08}$

5/10

$Z_{0,03} > Z$   
 $1,98 > 1,48$

$1 - 0,03 = 0,97$

W Odbacujemo  $H_0$   
 $Z < Z_{0,03}$

Spisak Gorekara 16/22  
 19.12.2022.  
 Biljana Proizvodnja

4.

Podpora / Budua	100 n <sub>1</sub>	100 n <sub>2</sub>
	79%	45%
	n <sub>1</sub> 450	n <sub>2</sub> 450

k = 0,02

Test uporeditvanja proporcija

H<sub>0</sub> p<sub>1</sub> > p<sub>2</sub>

① Kacunanje parametara

$$\hat{p} = \frac{n_1 \cdot p_1 + n_2 \cdot p_2}{n_1 + n_2} = \frac{118,5 + 45}{850} = 0,165$$

$$\hat{p} = 0,165$$

② Test stat.

$$Z = \frac{p_1 - p_2}{\sqrt{\hat{p}(1-\hat{p})}} \cdot \frac{\sqrt{\frac{n_1}{n_1+1} + \frac{n_2}{n_2+1}}}{1}$$

$$Z = \frac{0,179 - 0,145}{\sqrt{0,165 \cdot 0,35}} \cdot \frac{\sqrt{\frac{150}{4} + \frac{1}{100}}}{1}$$

$$Z = \frac{0,34}{0,47}$$

~~scribbled out text~~

$$Z = 0,72 \cdot \frac{\sqrt{\frac{300}{2} + \frac{300}{3}}}{1}$$

$$Z = 0,72 \cdot \frac{\sqrt{\frac{5}{300}}}{1}$$

$$Z = 0,72 \cdot \frac{\sqrt{0,017}}{1}$$

$$Z = 0,72 \cdot \frac{0,13}{1}$$

$$|Z| = 5,54$$

W

odbacujemo H<sub>0</sub>

Z<sub>0,02</sub> = 5,54

15,115

Z<sub>0,02</sub> < Z

Z<sub>1-0,02</sub> = 1,9830

1 - 0,02 = 0,98

Z<sub>0,02</sub> = 2,12

③ Kritična vrijednost

scribbled out text

3. Novice M:lid B gress

1. Recursing Parameter

$$\bar{X} = \frac{1.2 + 1.3 + 1.5 + 1.7 + 1.9 + 2.2 + 2.5 + 2.8 + 3.1 + 3.4 + 3.7}{11} = 2.16$$

$$\bar{X} = \frac{21.6}{11} = 1.96$$

*imagine  
s' mit helfen*

$$s^2 = \frac{1}{11} [(1.2-1.96)^2 + (1.3-1.96)^2 + (1.5-1.96)^2 + (1.7-1.96)^2 + (1.9-1.96)^2 + (2.2-1.96)^2 + (2.5-1.96)^2 + (2.8-1.96)^2 + (3.1-1.96)^2 + (3.4-1.96)^2 + (3.7-1.96)^2] = 0.05$$

$$V = \frac{14}{0.25} = 56$$

$$S = \sqrt{V} = \sqrt{56} = 7.48$$

2. Test statistic

$$T = \frac{\bar{X} - \mu}{\frac{S}{\sqrt{n}}}$$

$$T = \frac{1.44 - 1.3}{\frac{7.48}{\sqrt{11}}} = \frac{0.14}{2.27} = 0.06$$

*imagine  
s' mit helfen*

Observe! 2 mo

H<sub>0</sub>

2 mo



Danda deyere' 49/22 Byrupa Bilina

prag značajnost! 0,02

	Bedua	Bedua
Bedua	118,5	45
	45%	45%

uporedivane proporcija ✓

$H_0: p_1 = p_2$   $H_1: p_1 > p_2$

$$\hat{p} = \frac{n_1 \cdot p_1 + n_2 \cdot p_2}{n_1 + n_2} = \frac{118,5 \cdot 0,79 + 45 \cdot 0,45}{118,5 + 45} = \frac{93,6 + 20,2}{163,5}$$

$\hat{p} = 0,69$

Test statistika

$$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p} \cdot (1 - \hat{p})}} \cdot \frac{1}{\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$Z_{0,02} = 65,1 > Z$  prihvatamo

8 115

$$Z = \frac{0,79 - 0,45}{\sqrt{0,69 \cdot (1 - 0,69)}} \cdot \frac{1}{\sqrt{\frac{1}{118,5} + \frac{1}{45}}} = \frac{0,34}{0,031} = 10,97$$

65,1

$p_1 = 0,79$ ,  $p_2 = 0,45$



- 1.1
- 1.4
- 1.3
- 1.5
- 1.8
- 1.2
- 1.4
- 1.9
- 1.8
- 1.2
- 1.3
- 1.7
- 1.5
- 1.3
- 1.2
- 3.

15-1

$$(1.1 - 1.7)^2 + (1.1 - 1.5)^2 + (1.1 - 1.3)^2 - (1.1 - 1.2)^2 =$$

$$V = (1.1 - 1.4)^2 + (1.1 - 1.3)^2 + (1.1 - 1.5)^2 + (1.1 - 1.8)^2 + (1.1 - 1.2)^2 + (1.1 - 1.4)^2 + (1.1 - 1.9)^2 + (1.1 - 1.2)^2 + (1.1 - 1.3)^2 +$$

15

$$+ 1.2 + 1.8 + 1.5 + 1.3 + 1.4 + 1.1 = 1.44$$

$$\bar{X} = 1.2 + 1.3 + 1.5 + 1.7 + 1.3 + 1.2 + 1.8 + 1.9 + 1.4$$

(4) Uebung: it ~~...~~ Pg

$n_1$  150  
 $p_1$  79%

$n_2$  - Vergleichsgruppe

$n_2$  100  
 $p_2$  53%

proportio.

Uebung: it Bd

Grundfrage 10/12/2 6/11

$H_0: p_1 = p_2$   
 $H_1: p_1 > p_2$

Rochnung Parameter:

$$\hat{p} = \frac{n_1 \cdot p_1 + n_2 \cdot p_2}{n_1 + n_2} =$$

$$= \frac{118.5 + 53}{230}$$

Test statistik

$$Z = \frac{\sqrt{\hat{p}(1-\hat{p})}}{p_1 - p_2}$$

$$\sqrt{\frac{130}{230} + \frac{100}{230}}$$

$Z_{0.02} = ?$   
 (kritische Wert)

~~10/11~~ 10/11



$$\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$$\frac{0.79 - 0.53}{\sqrt{0.65 \cdot (1 - 0.65)}}$$

~~0.65~~ = ~~...~~

$$\frac{130 + 100}{150 \cdot 0.79 + 100 \cdot 0.53}$$





$$\frac{(11 - 1.4)^2}{15}$$

~~11~~

$$\bar{x} = \frac{1.2 + 1.3 + 1.4 + 1.5 + 1.6 + 1.7 + 1.8 + 1.9 + 2.0 + 2.1 + 2.2 + 2.3 + 2.4 + 2.5}{15} = 1.74$$

$$U = 1.2 - 1.4)^2 + (1.3 - 1.4)^2 + (1.4 - 1.4)^2 + (1.5 - 1.4)^2 + (1.6 - 1.4)^2 + (1.7 - 1.4)^2 + (1.8 - 1.4)^2 + (1.9 - 1.4)^2 + (2.0 - 1.4)^2 + (2.1 - 1.4)^2 + (2.2 - 1.4)^2 + (2.3 - 1.4)^2 + (2.4 - 1.4)^2 + (2.5 - 1.4)^2$$

Generis dopunktet 2012  
Gurhan 2009/2010



3. Proizvodac tvrdi da je dužina proizvoda 1,3m sa standardnom devijacijom 0,15m. 15 mjerenja dala je rez:

- 1,2 1,3 1,5 1,7 1,3 1,2 1,8 1,9 1,4 1,2 1,8 1,5 1,3 1,4 1,1
- prag značajnosti 0,03

[K] Test za očekivane populacije kada je poznata standardna devijacija

$$H_0: \mu = 1,3 \quad H_1: \mu > 1,3$$

(1) Računanje parametara

$$\bar{X} = \frac{1,2 + 1,3 + 1,5 + 1,7 + 1,3 + 1,2 + 1,8 + 1,9 + 1,4 + 1,2 + 1,8 + 1,5 + 1,3 + 1,4 + 1,1}{15}$$

$$\bar{X} = \frac{21,6}{15} = 1,44$$

$$n = 15$$

$$S = 0,15$$

$$\mu = 1,3$$

(2) Test statistika

$$Z = \frac{\bar{X} - \mu}{\frac{S}{\sqrt{n}}} = \frac{1,44 - 1,3}{\frac{0,15}{\sqrt{15}}} = 3,87 = 0,28 \cdot 3,87 = 1,08$$

(3) Kritična vrijednost

$$Z_{0,03} = 1,93$$

$$Z_{0,03} > Z$$

prihvatamo  $H_0$  !!!

NO/NO



4. Na vzorku od 150 učenců iz Podgorice i 100 učenců iz Budve zkuseno je da li ce 79% učenů iz Podgorice i 45% iz Budve položiti test. Uz prag značajnosti 0,02 testirajte hipotezu da ce veći % učenka iz Podgorice položiti test.

R] Test za uporedivanje proporcija

$H_0: p_1 = p_2$   
 $H_1: p_1 > p_2$

	Podgorica	Budva
$n_1 \leftarrow 150$	$p_1 \leftarrow 79\% = 0,79$	$45\% = 0,45$
$100 \rightarrow n_2$		

1) Računanje parametara

$$\hat{p} = \frac{n_1 \cdot p_1 + n_2 \cdot p_2}{n_1 + n_2} = \frac{150 \cdot 0,79 + 100 \cdot 0,45}{150 + 100} = \frac{118,5 + 45}{250} \Rightarrow \hat{p} = \frac{163,5}{250} = 0,65$$

(2) Test statistika

$$Z = \frac{\sqrt{\hat{p}(1-\hat{p}_1)} - \sqrt{\hat{p}(1-\hat{p}_2)}}{\sqrt{\hat{p} - \hat{p}_2}} \cdot \frac{\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}{1} = \frac{\sqrt{0,65(1-0,65)}}{0,79 - 0,45} \cdot \frac{\sqrt{\frac{1}{150} + \frac{1}{100}}}{1} = \frac{0,148}{0,34} \cdot \frac{0,112}{1} = 0,470 \cdot 8,13 = 5,181$$

(3) Kritična vrijednost

- 1(1/15

$$Z_{0,02} = 2,12$$

$Z > Z_{0,02} \Rightarrow$  Odbacuje se  $H_0$  !!!



②

Test statistika

$$Z = \frac{p_1 - p_2}{\sqrt{p(1-p) \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

0,654

0,346

$$\sqrt{\frac{1}{150} + \frac{1}{100}}$$

$$\frac{\sqrt{0,654 \cdot (1 - 0,654)}}{0,34}$$

Z =

$$\frac{\sqrt{0,654 \cdot 0,346}}{0,34}$$

Z =

$$\frac{\sqrt{\frac{1}{150} + \frac{1}{100}}}{1}$$

$$\frac{\sqrt{0,654 \cdot 0,346}}{0,34}$$

Z =

$$\frac{\sqrt{0,67}}{1}$$

$$\frac{0,22}{0,34}$$

Z =

$$Z = \frac{0,134}{0,22} \cdot 2,58$$

$$Z = 1,54 \cdot 2,58$$

$$Z = 3,98$$

③

Kritikanya vr.

$$F_{0,02} = 2,7 \leq 6 < F$$

adanya  $H_0$

15/11



0,67

0,60 + 0,01

Gruppa-B  
Bilgna prazn.

Statistika Petrowid 6/22

1.2 1.3 1.5 1.7 1.3 1.2 1.8 1.9 1.4 1.2  
1.8 1.5 1.3 1.4 1.1

3.  $H_1: \mu > 1.3$   
 $F_{0.03}$

$G = 0.5$

$n = 15$

Test Statistika

$$F = \frac{\bar{X} - \mu}{\frac{G}{n}} \cdot \sqrt{n}$$

$$F = \frac{1.44 - 1.3}{\frac{0.5}{15}} \cdot \sqrt{15}$$

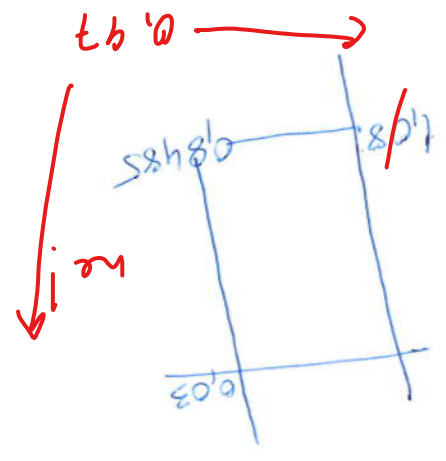
$$F = 0.28 \cdot \sqrt{15}$$

$$F = 1.08$$

$$F > Z_{0.03}$$

Obbauweise  $H_1$

9/10



4.  $F_{0.02}$  uperedivuanje proporcija

	$P_1$	$P_2$
$q$	$n_1 = 150$	$n_2 = 100$
	$45\%$	$45\%$

$P_1 > P_2$

$$\hat{p} = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} = \frac{150 \cdot 0.45 + 100 \cdot 0.45}{150 + 100}$$

$$\hat{p} = \frac{250}{118.5 + 45} = 0.654$$