

Webinar 3 - PowerPoint

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Def...1234567891011121314151617



Introduction to Statistical Methods

BITS Pilani
Pilani | Dubai | Hyderabad

Hypothesis Testing

ChatParticipants (35)

☐ Disable group chat

Srinivas T P
yes sir

Pravin Kumar MK
yes

Sankaranarayanan J
Yes Sir

K Loganathan
Yes

Ramesh Kumar Parthasarathy
Yes

Devi Prasad Kumar
yes sir

Dr. Manoj Mathur
yes sir

Rajeshwari G V
yes sir

Dr. Manoj Mathur
Good evening

Dr. Manoj Mathur
Good evening

Slide 1 of 25English (India)Accessibility: Investigate

NotesComments

7:32 PM2/8/2022

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Webinar-3 - PowerPoint

Monday, 2/8/2022

Virtual Classroom

Chat

Participants

☐ Disable group chat

Srinivasaraj T P
yes sir

Purnan Kumar M K
yes

Srinivasan J
Yes Sir

K Laganathar
Yes

Rajesh Kumar Pand...
Yes

Girishkumar Kumar Ta...
yes sir

Dileep Manoj Mathia...
yes sir

Rajpraveen S V
yes sir

Dileep Manoj Mathia...
Good evening

Generating comments
Ankit Shrivastava



Introduction to Statistical Methods

Hypothesis Testing

BITS Pilani
Pursuing Quality Education

Slide 1 of 23

English (India)

Accessibility: Investigate

Notes

Comments

94%

7:32 PM
2/8/2022

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MALAVIKA SHAMESH JOINED

PRASHANT SINGH JOINED

ISM-Turnipile JOINED

GURURAJA HIGGIE V JOINED

SHYAMALA BOWRI V G JOINED

SOURAV RAJ JOINED

RAHUL SAHA JOINED

JAYATHERITHA RAMACHANDRA KATTI JOINED

GANDIKOTA KIRANMAAYI JOINED

MUKUL MATHUR JOINED

AJITH K H JOINED

S BHASATHI JOINED

NITIN AGARWAL JOINED

YAMJALA HARISH KUMAR JOINED

SARAS JOINED

Sending to everyone
Write Message

Problem

For the United States, the mean monthly Internet bill is \$32.79 per household. A sample of 50 households in a southern state showed a sample mean of \$30.63. Use a population standard deviation of \$5.60.

- Formulate hypotheses for a test to determine whether the sample data support the conclusion that the mean monthly Internet bill in the southern state is less than the national mean of \$32.79.
- What is the value of the test statistic?
- What is the p -value?
- At $\alpha = .01$, what is your conclusion?



Chat



Participants

☐ Disable group chat

Write your message here

ANUJ KUMAR JOINED

Das Anriya Kumar
z testPavan Kumar M K
test statistic = -2.734

MANOJ K K JOINED

PRITHVI MOHAN JOINED

Das Anriya Kumar
as per the ask

NEERAJ SAI BHANI JOINED

Pavan Kumar M K
H0 is rejected and accept H1Manish Bapat
not condition is Ho

yes sir

AAKASHA JAIN JOINED

Sending to everyone
Write Message

Solution

$$H_0 : \mu \geq 32.79 \quad \text{--- according set}$$
$$H_a : \mu < 32.79 \quad \text{--- formulated as per situation}$$

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→ mean monthly bill = 32.79
 $n = 50$ ($n > 30$)
 $\sigma = 5.60$ is known (past data/
historic data)

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MANDJ K K JOINED

PRITHVI MOHAN JOINED

Das Arvika Kumar
as per the ask

NEERAJ SABIHANI JOINED

Favish Kumar M K
H0 is rejected and accept H1Manas Baghel
not condition is Ho

yes sir

AAKASHA JAIN JOINED

PEDDADA CHAKRAVARTHY JOINED

Rajesh A
 $\bar{x} - \mu / (\sigma / \sqrt{n})$ Favish Kumar M K
 $(\bar{x} - \mu) / (\sigma / \sqrt{n})$

SUOP GHOSH JOINED

Sending to everyone
Write Message

Problem

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→ mean monthly bill = 32.79
 $n = 50$ ($n > 30$)
 $\sigma = 5.60$ is known (past data/historic data)

☐ Disable group chat

Manas Bajpai
not condition is Ho

yes sir

AAKASHA JAIN JOINED

PEDDADA CHAKRAVARTHY JOINED

Rajesh A
 $\bar{x} - \mu / (\sigma / \sqrt{n})$

Pavan Kumar M K
 $\bar{x} - \mu / \sigma / \sqrt{n}$

SUDIP GHOSH JOINED

Das Anriya Kumar
-2.727

KARTHIK JOINED

DEEPAK KUMAR JOINED

P value is not covered in section

Can you please explain again

Sending to everyone
Write Message

Solution

$$H_0 : \mu \geq 32.79 \quad \text{--- according set}$$

$$H_a : \mu < 32.79 \quad \text{--- formulated as per simulation}$$

$$Z = \frac{\mu - \mu_0}{\frac{\sigma}{\sqrt{n}}} = \frac{30.63 - 32.79}{\frac{5.6}{\sqrt{50}}} = -2.73$$

☐ Disable group chat

Manas Bajpai
not condition is Ho

yes sir

AAKASHIA JAIN JOINED

PEDDADA CHAKRAVARTHY JOINED

Rajesh A
 $\bar{x} - \mu / (\sigma / \sqrt{n})$

Pavan Kumar M K
 $\bar{x} - \mu / (\sigma / \sqrt{n})$

SUDIP GHOSH JOINED

Das Aniraj Kumar
-2.727

KARTHIK JOINED

DEEPAK KUMAR JOINED

P value is not covered in section

Can you please explain again

Sending to everyone
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AAKASHA JAIN JOINED

PEDDADA CHAKRABARTHY JOINED

Rishabh A

 $xbar - mu / (sigma / \sqrt{n})$

Pawan Kumar S R

 $(x - \mu) / (s / \sqrt{n})$

SUDIP GHOSH JOINED

[De] Aranya Kumar

-2.727

KARTHIK JOINED

DEEPAK KUMAR JOINED

P value is not covered in section

Can you please explain again

HARSH VASHISHT JOINED

Pawan Kumar M K

reject

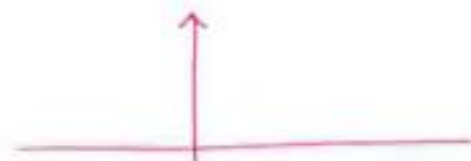
Sending to everyone
White Message

Solution

 $H_0 : \mu \geq 32.79$ - - - - - accordingly set $H_a : \mu < 32.79$ - - - - - formulated
as per situation

$$Z = \frac{\mu - \mu_0}{\frac{\sigma}{\sqrt{n}}} = \frac{30.63 - 32.79}{\frac{5.6}{\sqrt{50}}} = -2.73$$

$$\alpha = 0.01$$



FileHomeInsert

Def...

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BusinessStatistics

New -

Sort -

View -

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This PC > New Volume (D:) > F > mandar > Symbiosis > BusinessStatistics

Search BusinessStatistics

Name	Date modified	Type	Size
Mind Tree			
Unit-III		Folder	

OneDrive - Perso

This PC

- Desktop
- Documents
- Downloads
- Music
- Pictures
- Videos
- Windows (C:)
- New Volume (D:)

Symbiosis25 items

Virtual Classroom

Chat

Participants

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Rahul Saha< less than

Dipu Mless than

Saravanan Jleft tailed test

Anjali Kumar Kesh...mean

Rajesh Aupper one tail test

as we need to test H0

Anjali Kumar KeshariMu is less than Mu0

Gunasakaran Rwe have not referred thr 2 tab

Pavan Kumar M Kcritical value = 2.575

Sending to everyone

Write Message

mean monthly bill is less the whole

Slide 5 of 23

English (India)

Accessibility: Investigate

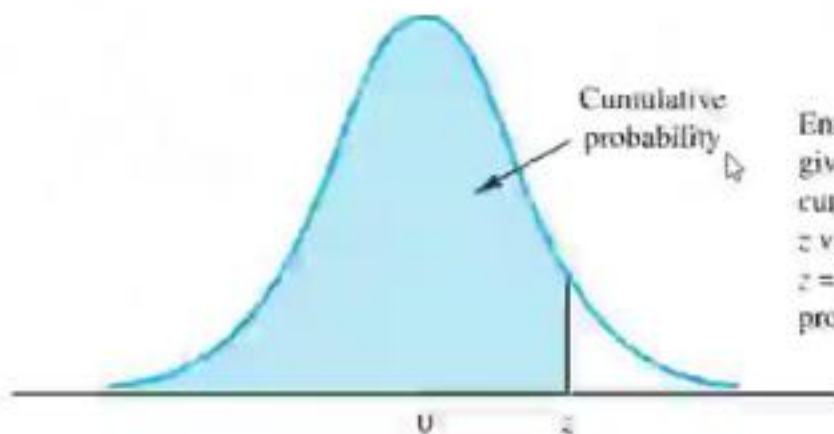
Notes

Comments

ENG IN

7:43 PM2/8/2022

CUMULATIVE PROBABILITIES FOR THE STANDARD NORMAL DISTRIBUTION



Entries in the table give the area under the curve to the left of the z value. For example, for $z = 1.25$, the cumulative probability is .8944.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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 Rahul Saha
 < less than

 Dix M
 less than

 Saravanan J
 left tailed test

 Anjali Kumar Kesh...
 mean

 Rajesh A
 upper one tail test

 as we need to test H_0

 Anjali Kumar Keshari
 Mu is less than μ_0

 Gunasekaran R
 we have not referred the z table

 Pavan Kumar M K
 critical value = 2.575

 Sending to everyone
 Write Message

.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854
2.2	.9864	.9868	.9871	.9874	.9877	.9880	.9883	.9886	.9889
2.3	.9892	.9894	.9896	.9898	.9900	.9901	.9902	.9903	.9904

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Pavan Kumar M K

< less than

Biju M

less than

Sarastran J

left tailed test

Anjali Kumar Keshi...

mean

Rajesh A

upper one tail test

as we need to test H0

Anjali Kumar Keshari

Mu is less than Mu0

Gurusekaran R

we have not referred thr 1 tab

Pavan Kumar M K

critical value = 2.575

SENTHIL T K JOINED

Sending to everyone

Write Message

.9706

.9767

.9817

.9857

.9907

.9907

2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9813
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990

1. *Adaptation*

Solution

$\rightarrow H_0 : \mu \geq 32.79$ --- according to set
 $H_a : \mu < 32.79$ --- formulated as per situation

$$Z = \frac{\mu - \mu_0}{\frac{\sigma}{\sqrt{n}}} = \frac{30.63 - 32.79}{\frac{5.6}{\sqrt{50}}} = -2.73$$

$$\alpha = 0.01$$



we will reject H_0 conclude
 mean monthly bill is less



Rajesh A
upper one tail test

as we need to test H₀

Anjali Kumar Kishari
Mu is less than Mu₀

Gunasekaran R
we have not referred thr z tal

Pawan Kumar M K
critical value = 2.575

SENTHIL P K JOINED

PREETHI REDDIA SAHU JOINED

Das Aranya Kumar
0.0032

ZEENATH BIBI JOINED

It should be -ve

SAIAKHIRAJA M JOINED

Sending to everyone
Write Message

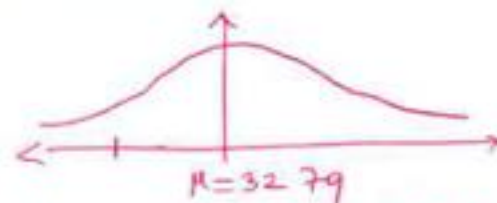
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$$\alpha = 0.01$$



We will reject H_0 : conclude that the
mean monthly bill is less the whole

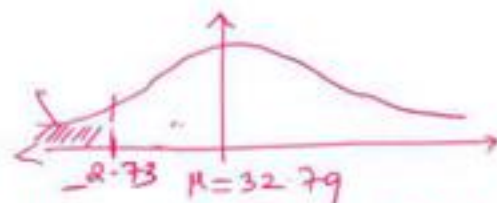
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$$\alpha = 0.01$$



$$\begin{array}{r} 1.000 \\ 0.9166 \\ \hline 0.0832 \end{array}$$

We will reject H_0 : conclude that the
mean monthly bill is less the whole

☐ Disable group chat

Paran Kumar M K

critical value = 2.575

SENTHIL T K JOINED

PREETI REXHA SAHU JOINED

Dan Aniya Kumar

0.0032

ZEENATH BIBI JOINED

it should be -ve

SAIKUNWAJA M JOINED

Z table also should be -ve refe

Rajesh A

yes

ASHU JOINED

0.0033

Anant Kumar Kesh...

yes

Sending to everyone

Write Message

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PREETI REDHIA SAIJU JOINED

Das Anvika Kumar
0.0032

7:46 pm

ZINATH BIBI JOINED

It should be -ve

7:46 pm

SARATHURAJA M. JOINED

Z table also should be -ve refe

Rajesh A
yes

7:46 pm

ASHU JOINED

0.0033

7:46 pm

Anjali Kumar KeshL.
yes

7:46 pm

PRAKASH KUMAR JOINED

Rajesh A
we accept H0

7:46 pm

Sending to everyone
Write Message

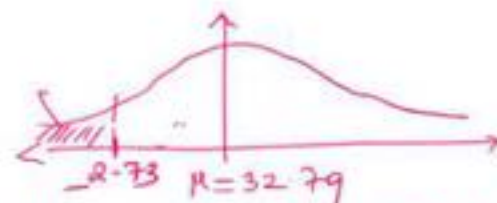
Solution

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$$\alpha = 0.01$$

$$\alpha = 5\%$$



We will reject H_0 : conclude that the mean monthly bill is less the whole nation

Accessibility recommendations found. Click here to investigate.

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SAHARUNRAJA M JOINED

Z table also should be -ve refe

Rajesh A
yes

ASHU JOINED

0.0033

Anjali Kumar Kesh..
yes

PRAKASH KUMAR JOINED

Rajesh A
we accept H0Saranman J
sameAnuj Kumar
we can reject null hypothesisBiju M
accept H0Sending to everyone
Write Message

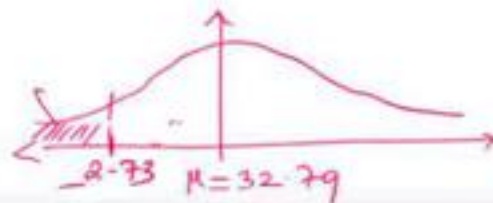
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$$\alpha = 0.01$$

$$\alpha = 5\%$$



$$\begin{array}{r} 1.000 \\ 0.9166 \\ \hline 0.0832 \end{array}$$

We will reject
mean value

pdfcoffee.com_statistics-for-b... Statistics for Business and Ec... z-table.pdf - Adobe Reader

2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990

☐ Disable group chat

SAHARUNRAJA M JOINED

2 table also should be -ve ref

Panel A

YES

KONGA JOINED

Panel A

YES

Panel A

YES

POORVI SUMAN JOINED

Panel A

YES ACCEPTED

Panel A

YES

Panel A

YES

Panel A

YES

Rajesh A
yes

ASHU JOINED

0.0033

Anjam Kumar Kesh...
yes

PRAKASH KUMAR JOINED

Rajesh A
we accept H0Srivastava J
sameAnuj Kumar
we can reject null hypothesisBij M
accept H0Srivastava J
5% reject H0 and accept H1Sending to everyone
Write Message

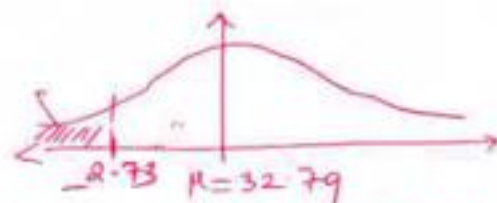
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 as per simulation

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$$\alpha = 0.01$$

$$\alpha = 5\%$$



$$\begin{array}{r} 1.000 \\ 0.9168 \\ \hline 0.0832 \end{array}$$

We will reject H_0 : conclude that the
 mean monthly bill is less the whole nation

Problem

AOL Time Warner Inc.'s CNN has been the longtime ratings leader of cable television news. Nielsen Media Research indicated that the mean CNN viewing audience was 600,000 viewers per day during 2002. Assume that for a sample of 40 days during the first half of 2003, the daily audience was 612,000 viewers with a sample standard deviation of 65,000 viewers.

- What are the hypotheses if CNN management would like information on any change in the CNN viewing audience?
- \times What is the p -value?
- Select your own level of significance. What is your conclusion? $\alpha = 0.05$ $1 - \alpha = 0.95$
- What recommendation would you make to CNN management in this application?

$$H_0: \mu = 600000$$
$$H_a: \mu \neq 600000$$

$$s = 65000$$

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K. SREEDHAR J. JOINED

DHEENMORA KUMAR SINGH JOINED

Vansha jethley
can't please show calculation
value atleast

Shravan jain
H0: $\mu = 60$

YES

Vijay
Z two tailed test H0: 600000

Shravan jain
 $\mu = 60$

DASAMITHA KUMAR JOINED

MRINAL KANT JANA JOINED

Pawan Kumar M.B.
result: accept H0 at 95%
confidence level

Sending to everyone
Write Message

TABLE 2 *t* DISTRIBUTION (Continued)

Degrees of Freedom	Area in Upper Tail					
	.20	.10	.05	.025	.01	.005
35	.852	1.306	1.690	2.030	2.438	2.724
36	.852	1.306	1.688	2.028	2.434	2.719
37	.851	1.305	1.687	2.026	2.431	2.715
38	.851	1.304	1.686	2.024	2.429	2.712
39	.851	1.304	1.685	2.023	2.426	2.708
40	.851	1.303	1.684	2.021	2.423	2.704
41	.850	1.303	1.683	2.020	2.421	2.701
42	.850	1.302	1.682	2.018	2.418	2.698
43	.850	1.302	1.681	2.017	2.416	2.695
44	.850	1.301	1.680	2.015	2.414	2.692
45	.850	1.301	1.679	2.014	2.412	2.690
46	.850	1.300	1.679	2.013	2.410	2.687
47	.850	1.300	1.678	2.012	2.409	2.685

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from Two different pop
sample and that's why
difference? What is the
conclusion if we reject t
hypothesis or accept it

Dattaraya Udapras Kulkarni
2 different populations

Rajesh A
but student t test is mor
and post comparison r

Pavan Kumar M K
accept H0

Guneskaran R
t table to be referred

SONAR ADITI DEEPAK

V R Lijo
2.030

Dattaraya Udapra...
2.023

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53 848 1.298 1.674 2.006 2.399 2.672

Problem

AOL Time Warner Inc.'s CNN has been the longtime ratings leader of cable television news. Nielsen Media Research indicated that the mean CNN viewing audience was 600,000 viewers per day during 2002. Assume that for a sample of 40 days during the first half of 2003, the daily audience was 612,000 viewers with a sample standard deviation of 65,000 viewers.

- What are the hypotheses if CNN management would like information on any change in the CNN viewing audience?
- What is the p -value?
- Select your own level of significance. What is your conclusion? $\alpha = 0.05$ $1 - \alpha = 0.95$
- What recommendation would you make to CNN management in this application?

$$\begin{aligned} H_0: \mu &= 600000 & S &= 65000 \\ H_a: \mu &\neq 600000 & t &= \frac{\bar{x} - \mu}{S/\sqrt{n}} & n-1 &= 39 \\ \alpha &= 0.05 & & & & = 1.17 \\ & & H_0 & \text{accepted} & & \end{aligned}$$

Chat

Participant

☐ Disable group chat

Dattatraya Udagane Kulkarni
no difference in viewership

Bhimans Joshi
sorry can u explain why t test?

Guneswaran R
a, i dont understand the question

B CHEMANTH KUMAR JOINED

Bhimans Joshi
ok

I thought sample > 30 is only criteria

Bijay Manoj Madhuskar
So here recommendation is - CNN content need to be changed/improved to increase number of viewers. Is this right?

Rajesh A
but there is no mention of any change between 2002 and 2003

Sending to everyone
Write Message

Problem

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Chat

Participant

☐ Disable group chat

Shravan Joshi

ok

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Raesh A

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SHIBU PAUL JOINED

Varsha jettley

what is criteria of selecting alpha?

Bire Manoj Madhuskar

Alpha selection is typical values

Shravan Joshi

1 kg

Sending to everyone

Write Message

Notes

Problem



AOL Time Warner Inc.'s CNN has been the longtime ratings leader of cable television news. Nielsen Media Research indicated that the mean CNN viewing audience was 600,000 viewers per day during 2002. Assume that for a sample of 40 days during the first half of 2003, the daily audience was 612,000 viewers with a sample standard deviation of 65,000 viewers.

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 \alpha &= 0.05 & & & & s/\sqrt{n} = 1.17 \\
 & & & & & H_0 \text{ accepted}
 \end{aligned}$$

☐ Disable group chat

Birje Mamaj Madhusar
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Rajesh A
but there is no mention of any change between 2002 and 2003

SHEBU K PAUL JOINED

Vansha jettley
what is criteria of selecting alpha?

Birje Mamaj Madhusar
Alpha selection is typical values

Bhimsen profile
19s

BIJU M JOINED

Arpan Kumar Kishori
So can we say the change is due to given standard deviation

Sending to everyone
Write Message

TABLE 2 t DISTRIBUTION (Continued)

Degrees of Freedom	Area in Upper Tail				
	.20	.10	.05	.025	.01
35	.852	1.306	1.690	2.030	2.438
36	.852	1.306	1.688	2.028	2.434
37	.851	1.305	1.687	2.026	2.431
38	.851	1.304	1.686	2.024	2.429
39	.851	1.304	1.685	2.023	2.426
40	.851	1.303	1.684	2.021	2.423
41	.850	1.303	1.683	2.020	2.421
42	.850	1.302	1.682	2.018	2.418
43	.850	1.302	1.681	2.017	2.416
44	.850	1.301	1.680	2.015	2.414
45	.850	1.301	1.679	2.014	2.412
46	.850	1.300	1.679	2.013	2.410
47	.849	1.300	1.678	2.012	2.408
48	.849	1.299	1.677	2.011	2.407
49	.849	1.299	1.677	2.010	2.405
50	.849	1.299	1.676	2.009	2.403
51	.849	1.298	1.675	2.008	2.402
52	.849	1.298	1.675	2.007	2.400
53	.848	1.298	1.674	2.006	2.399

☐ Disable group chat

Enable or disable group chat.

Bryn Mery Mathias

Alpha selection is typical values

Sharon John

12

Bryn M. joined

Approach to solution

So can we say the change is due to given standard deviation

Sharon John

ok

please show impact of different

alpha

KISHAMMED NAYAZUDDIN joined

Bryn Mery Mathias

yes, impact of Alpha to be checked

Sharon John

ok

Sharon John

Sharon John

2.680

2.678

2.676

2.674

2.672



ENG

IN

8:04 PM
2/8/2022

TABLE 2 *t* DISTRIBUTION (Continued)

Degrees of Freedom	Area in Upper Tail					
	.20	.10	.05	.025	.01	.005
35	.852	1.306	1.690	2.030	2.438	2.724
36	.852	1.306	1.688	2.028	2.434	2.719
37	.851	1.305	1.687	2.026	2.431	2.715
38	.851	1.304	1.686	2.024	2.429	2.712
39	.851	1.304	1.685	2.023	2.426	2.708
40	.851	1.303	1.684	2.021	2.423	2.704
41	.850	1.303	1.683	2.020	2.421	2.701
42	.850	1.302	1.682	2.018	2.418	2.698
43	.850	1.302	1.681	2.017	2.416	2.695
44	.850	1.301	1.680	2.015	2.414	2.692
45	.850	1.301	1.679	2.014	2.412	2.690
46	.850	1.300	1.679	2.013	2.410	2.687
47	.849	1.300	1.678	2.012	2.408	2.685
48	.849	1.299	1.677	2.011	2.407	2.682
49	.849	1.299	1.677	2.010	2.405	2.680
50	.849	1.299	1.676	2.009	2.403	2.678
51	.849	1.298	1.675	2.008	2.402	2.676
52	.849	1.298	1.675	2.007	2.400	2.674
53	.848	1.298	1.674	2.006	2.399	2.672

TABLE 2 t DISTRIBUTION (Continued)

Degrees of Freedom	Area in Upper Tail				
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39	.851	1.304	1.685	2.023	2.426
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42	.850	1.302	1.682	2.018	2.418
43	.850	1.302	1.681	2.017	2.416
44	.850	1.301	1.680	2.015	2.414
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47	.849	1.299	1.678	2.012	2.408

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53 848 1.298 1.674 2.006 2.409 2.673

☐ Disable group chat

varsha jettley

ok

please show impact of different alpha

K.MOHAMMED HAYAZUDDIN JOINED

Bijoy Manoj Madhukar

yes. impact of Alpha to be checked.

varsha jettley

ok

Das Aranya Kumar

accept

V R Lyju

Reject

Bijoy Manoj Madhukar

Still same

varsha jettley

ok

Sending to everyone



Problem



AOL Time Warner Inc.'s CNN has been the longtime ratings leader of cable television news. Nielsen Media Research indicated that the mean CNN viewing audience was 600,000 viewers per day during 2002. Assume that for a sample of 40 days during the first half of 2003, the daily audience was 612,000 viewers with a sample standard deviation of 65,000 viewers.

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→

$$H_0: \mu = 600000$$

$$s = 65000$$

$$H_a: \mu \neq 600000$$

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} \quad n-1 = 39$$

$$= \frac{612000 - 600000}{65000/\sqrt{40}} = 1.17$$

$$\alpha = 0.05$$

$$\alpha = 0.1$$

$\alpha/2 = 0.05$ H_0 accepted

Chat

Participant

☐ Disable group chat

K MOHAMMED NAYAZUDDIN JOINED

Shre Manoj Mathurak
yes, impact of Alpha to be checked

Vansha jettley
ok

Das Ananya Kumar
accept

V Rishi
Reject

Shre Manoj Mathurak
Still same

Vansha jettley
ok

0.2 is very high value — mostly not taken?

GEETANJALI KAI JOINED

yes sir

Sending to everyone
Write Message

Problem

A study by *Consumer Reports* showed that 64% of supermarket shoppers believe supermarket brands to be as good as national name brands. To investigate whether this result applies to its own product, the manufacturer of a national name-brand ketchup asked a sample of shoppers whether they believed that supermarket ketchup was as good as the national brand ketchup.

- Formulate the hypotheses that could be used to determine whether the percentage of supermarket shoppers who believe that the supermarket ketchup was as good as the national brand ketchup differed from 64%.
- If a sample of 100 shoppers showed 52 stating that the supermarket brand was as good as the national brand, what is the p -value?
- At $\alpha = .05$, what is your conclusion?
- Should the national brand ketchup manufacturer be pleased with this conclusion? Explain.

☐ Disable group chat

V R Liju

Reject

Bijoy Manoj Madhu...

Still same

Vansha jettrey

ok

0.2 is very high value -- mostly not taken?

GEETANJALI KAJI JOINED

yes sir

ok understood thanks

Rajesh A

proportion

Dattaraya Uttapra...

yes

Sending to everyone

Write Message

ok understood thanks

Rajesh A
proportionDattatraya Udupira...
yesDas Aniya Kumar
YesDattatraya Udupira...
1 proportion test

CHINSU ELIZABETH MATHEW JOINED

Sreekumar T P
<> 64Dattatraya Udupira...
yes

2 tailed

Sending to everyone
Write Message

Problem

A study by *Consumer Reports* showed that 64% of supermarket shoppers believe supermarket brands to be as good as national name brands. To investigate whether this result applies to its own product, the manufacturer of a national name-brand ketchup asked a sample of shoppers whether they believed that supermarket ketchup was as good as the national brand ketchup.

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- If a sample of 100 shoppers showed 52 stating that the supermarket brand was as good as the national brand, what is the p -value?
- At $\alpha = .05$, what is your conclusion?
- Should the national brand ketchup manufacturer be pleased with this conclusion?

Explain

$$H_0: p = 0.64$$

$$H_a: p \neq 0.64$$

Solution

$$H_0 : p = 0.64$$

$$H_a : p \neq 0.64$$

Virtual Classroom

Chat

Participant

☐ Disable group chat

proportion

Discontinuity in p

YES

Discontinuity in p

YES

Discontinuity in p

1 proportion test

CHINCHU ELIZABETH MATTHEW JOINED

Discontinuity in p

YES

2 tailed

ANJANI KOMAR KESHANI JOINED

0.52

Sending to your phone

Write Message

Solution

$$H_0: p = 0.64$$

$$H_a: p \neq 0.64$$

$$n = 100$$

$$\bar{p} = \frac{52}{100} = 0.52$$

$$\alpha = 0.05$$

$$Z = \frac{\bar{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} =$$

Chat

Participant

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Dattatraya Udayra...

yes

2 tailed

ANAGNI KUMAR KESHARI JOINED

0.52

Null

z test

Rajesh A

Z

Ranul Saha

Z

Dattatraya Udayrao Kulkarni
approximated to normalDattatraya Udayrao Kulkarni
 $p - p_0 / \sqrt{p(1-p)}$

SUBHODDEEP MITRA JOINED

Sending to everyone
Write Message

.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986

.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.813
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.838
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.862
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.883
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.901
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.917
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.931
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.944
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.954
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.963
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.970
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.976
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.981
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.985
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.989
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.991
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.993
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986

2 tailed

ANJANI KUMAR KESHA

0.52

Yuen

z test

Raghu A

2

Rajul Sahu

2

Dattatraya Udaypran Kulkarni
approximated to normDas Aranya Kumar
 $p - p_0/\sqrt{p_0 q/n}$

SUBHODIP MITRA

Prasen Bhatia Sahu

-2.50







Joining to everyone

Write Message

.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
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1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
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2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986

FileEditViewWindowHelp

Open



1








1

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+

143%

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ToolsFill & SignComment

	.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
	.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0		.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1		.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2		.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
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1.6		.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7		.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8		.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9		.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0		.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1		.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2		.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3		.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4		.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936

2.5

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.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
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2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986

.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
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1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890

	0	1	2	3	4	5	6	7	8	9
0.9	.8159	.8180	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
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2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990

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2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990

Problem

A study by *Consumer Reports* showed that 64% of supermarket shoppers believe supermarket brands to be as good as national name brands. To investigate whether this result applies to its own product, the manufacturer of a national name-brand ketchup asked a sample of shoppers whether they believed that supermarket ketchup was as good as the national brand ketchup.

- Formulate the hypotheses that could be used to determine whether the percentage of supermarket shoppers who believe that the supermarket ketchup was as good as the national brand ketchup differed from 64%.
- If a sample of 100 shoppers showed 52 stating that the supermarket brand was as good as the national brand, what is the p -value?
- At $\alpha = .05$, what is your conclusion?
- Should the national brand ketchup manufacturer be pleased with this conclusion? Explain.

$$H_a: p \neq 0.64$$

$$H_0: p = 0.64$$

☐ Disable group chat

Rajesh A

Z

Rahul Saha

Z

Dattatraya Udagtrao Kulkarni
approximated to normal

Das Aniya Kumar
p-p0/sqrt p q/n

SUBHODEEP MITRA JOINED

Preethi Raveha Saha
-2.50

ARAVIND P JOINED

Dattatraya Udagtrao
reject null

rejection

Boje Manoj Madhu
rejection

sending to everyone
Write Message

Problem

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$$H_0: p = 0.64$$

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Uttamya Udagawa Kulkarni
approximated to normal

Das Aniraj Kumar
 $p = p_0 / \sqrt{n}$

SUBHODEEP MITRA JOINED

Preeti Ravi Sahu
-2.50

ARAVIND P JOINED

Dattatraya Chakrabarti
reject null

rejection

Biye Manoj Madhavan
rejection

Bhuvan Joshi
H1 is accepted

Dattatraya Udagawa Kulkarni
super mkt brands different from
national brands

Sending to everyone
Write Message

Problem

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$$H_a: p \neq 0.64$$

$$H_0: p = 0.64$$

Virtual Classroom

Chat Participants

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Preeti Rekha Sahu
-2.50

ARAVIND P. JOINED

Dattatraya Udapina...
reject null

rejection

Bijay Manoj Madhu...
rejection

Bhramen Joshi
H1 is accepted

Dattatraya Udapina Kulkarni
super mkt brands different from national brands

at 95%

Bhramen Joshi
yes different from 64% at 95% confidence

Sending to everyone
Write Message

☐ Disable group chat

-2:30

ARAVIND P. JOINED

Dattaraya Udape...
reject null

rejection

Dhe Manoj Madhu...
rejectionBhimsen Joshi
H1 is acceptedDattaraya Udape...
super mkt brands different from
national brands

at 95%

Bhimsen Joshi
yea different from 64% at 95%
confidence

false negative

Sending to everyone

Write Message

Problem

Young Adult magazine states the following hypotheses about the mean age of its subscribers. If $H_0: \mu = 28$, $H_a: \mu \neq 28$

If the manager conducting the test will permit a 0.15 probability of making a Type II error when the true mean age is 29, what sample size should be selected? Assume $\sigma = 6$ and a 0.05 level of significance.

Type-II error

Problem

Young Adult magazine states the following hypotheses about the mean age of its subscribers. If $H_0: \mu = 28$, $H_a: \mu \neq 28$

If the manager conducting the test will permit a 0.15 probability of making a Type II error when the true mean age is 29, what sample size should be selected? Assume $\sigma = 6$ and a 0.05 level of significance.

Type-II error Accept H_0 when it is false

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H1 is accepted

Danaraya Udagayao Kulkarni
super mkt brands different from national brands

at 95%

Bhramen Joshi
yea different from 64% at 95% confidence

false negative

Varsha Jetley
rejection

Danaraya Udagayao Kulkarni
accepting H_1 and when H_1 is not true

Rajesh A
Accept Null Hypothesis when it is false

Manas Bagai
FALSE H_0

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Write Message

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Bookmarks

- Chapter 20: Statistical Methods for Quality Control
- Chapter 21: Decision Analysis
- Appendix A: References and Bibliography
- Appendix B: Tables
- Appendix C: Summation Notation
- Appendix D: Self-Test Solutions and Answers to Even-Numbered Exercises
- Appendix E: Using Excel Functions
- Appendix F: Computing p-Values Using Minitab and Excel
- Index

434 Chapter 10 Inference About Means and Proportions with Two Populations

Applications

30. A *BusinessWeek*/Harris survey asked senior executives at large corporations their opinions about the economic outlook for the future. One question was, "Do you think that there will be an increase in the number of full-time employees at your company over the next 12 months?" In the current survey, 220 of 400 executives answered yes, while in a previous year survey, 192 of 400 executives had answered yes. Provide a 95% confidence interval estimate for the difference between the proportions at the two points in time. What is your interpretation of the interval estimate?

31. The Professional Golf Association (PGA) measured the putting accuracy of professional golfers playing on the PGA Tour and the best amateur golfers playing in the World Amateur Championship (*Golf Magazine*, January 2007). A sample of 1075 6-foot putts by professional golfers found 688 made putts. A sample of 1200 6-foot putts by amateur golfers found 688 made putts. Estimate the difference in the proportions of made putts by professional golfers. Which group had a better

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Applications

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- Estimate the proportion of made 6-foot putts by professional golfers. Estimate the proportion of made 6-foot putts by amateur golfers. Which group had a better putting accuracy?
 - What is the point estimate of the difference between the proportions of the two populations? What does this estimate tell you about the percentage of putts made by the two

☐ Disable group chat
accepting H1 and when I is not true

Rajesh A
Accept Null Hypothesis when it is false

Manish Rajeev
FALSE H0

Duraiswamy Udayaraj
H0

Brinwan Joshi
What is positive and negative can u please explain?

false positive

or false negative

false positive

ok

Confusion matrix, we know

Sending to everyone

Write Message

Applications

30. A *BusinessWeek*/Harris survey asked senior executives at large corporations their opinions about the economic outlook for the future. One question was, "Do you think that there will be an increase in the number of full-time employees at your company over the next 12 months?" In the current survey, 220 of 400 executives answered yes, while in a previous year survey, 192 of 400 executives had answered yes. Provide a 95% confidence interval estimate for the difference between the proportions ^{of} at the two points in time. What is your interpretation of the interval estimate?
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 - a. Estimate the proportion of made 6-foot putts by professional golfers. Estimate the proportion of made 6-foot putts by amateur golfers. Which group had a better putting accuracy?
 - b. What is the point estimate of the difference between the proportions of the two populations? What does this estimate tell you about the percentage of putts made by the two groups?

WEB file

Mutual

Arch Small Cap Equity	14.57	Berger One Hundred
Bartlett Cap Basic	17.73	Columbia International Stock
Calvert World International	10.31	Dodge & Cox Balanced
Calvin Fund A	16.23	Evergreen Fund

Find
type
or

- a. Formulate H_0 and H_a such that rejection of H_0 leads to the conclusion that the load mutual funds have a higher mean annual return over the five-year period.
- b. Use the 60 mutual funds in the Investment Mutual to conduct the hypothesis test. What is the p -value? At $\alpha = 0.05$, what is your conclusion?
41. The National Association of Home Builders provided data on the cost of the most popular home remodeling projects. Sample data in units of thousands of dollars for two types of remodeling projects are as follows.

Kitchen	Master Bedroom	Kitchen	Master Bedroom
25.2	18.0	23.0	17.8
17.4	22.9	19.7	24.6
22.8	26.4	16.9	21.0
21.9	24.8	21.8	
19.7	26.9	23.6	

Virtual Classroom

Chat

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false

Manas Bajpai
FALSE HO

Danathya Udipura...
h0

Bhuvan Joshi
What is positive please explain?

false positive

or false negative

false positive

ok

Confusion matrix

but accept H0 wh
or Type II?

Sending to everyone
Write Message

- d. What is the probability of making a Type II error when the population mean is 70 minutes?
- e. Sketch the power curve for this problem.
75. A federal funding program is available to low-income neighborhoods. To qualify for the funding, a neighborhood must have a mean household income of less than \$15,000 per year. Neighborhoods with mean annual household income of \$15,000 or more do not qualify. Funding decisions are based on a sample of residents in the neighborhood. A hypothesis test with a .02 level of significance is conducted. If the funding guidelines call for a maximum probability of .05 of not funding a neighborhood with a mean annual household income of \$14,000, what sample size should be used in the funding decision study? Use $\sigma = \$4000$ as a planning value.
76. $H_0: \mu = 120$ and $H_a: \mu \neq 120$ are used to test whether a bath soap production process is meeting the standard output of 120 bars per batch. Use a .05 level of significance for the test and a planning value of 5 for the standard deviation.
- If the mean output drops to 117 bars per batch, the firm wants to have a 98% chance of concluding that the standard production output is not being met. How large a sample should be selected?
 - With your sample size from part (a), what is the probability of concluding that the process is operating satisfactorily for each of the following actual mean outputs: 117, 118, 119, 121, 122, and 123 bars per batch? That is, what is the probability of a Type II error in each case?

Virtual Classroom

Chat

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false

Minus Sign

FALSE H0

Datasets Unlabeled

H0

Blumenfeld

What is positive please explain?

false positive

or false negative

false positive

ok

Confusion matrix

but accept H0 wh or Type II?

Sending to everyone

Write Message

the sample size were provided in Sections 9.3 and 9.4. In the case of hypothesis testing a population proportion, the hypothesis testing procedure uses a test statistic based on a standard normal distribution.

In all cases, the value of the test statistic can be used to compute a p -value for the test. A p -value is a probability used to determine whether the null hypothesis should be rejected. If the p -value is less than or equal to the level of significance α , the null hypothesis can be rejected.

Hypothesis testing conclusions can also be made by comparing the value of the test statistic to a critical value. For lower tail tests, the null hypothesis is rejected if the value of the test statistic is less than or equal to the critical value. For upper tail tests, the null hypothesis is rejected if the value of the test statistic is greater than or equal to the critical value. Two-tailed tests consist of two critical values: one in the lower tail of the sampling distribution and one in the upper tail. In this case, the null hypothesis is rejected if the value of the test statistic is less than or equal to the critical value in the lower tail or greater than or equal to the critical value in the upper tail.

Extensions of hypothesis testing procedures to include an analysis of the Type II error were also presented. In Section 9.7 we showed how to compute the probability of making a Type II error. In Section 9.8 we showed how to determine a sample size that will control for the probability of making both a Type I error and a Type II error.

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Chat

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false

Minus Sign

FALSE H0

Data entry

h0

What is positive please explain?

false positive

or false negative

false positive

ok

Confusion matrix

but accept H0 wh or Type II?

Sending to everyone

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1. Once two of the three values are known, the other can be computed.
2. For a given level of significance α , increasing the sample size will reduce β .
3. For a given sample size, decreasing α will increase β , whereas increasing α will decrease β .

The third observation should be kept in mind when the probability of a Type II error is not being controlled. It suggests that one should not choose unnecessarily small values for the level of significance α . For a given sample size, choosing a smaller level of significance means more exposure to a Type II error. Inexperienced users of hypothesis testing often think that smaller values of α are always better. They are better if we are concerned only about making a Type I error. However, smaller values of α have the disadvantage of increasing the probability of making a Type II error.

Exercises

Methods

54. Consider the following hypothesis test.

$$H_0: \mu \geq 10$$

$$H_a: \mu < 10$$

The sample size is 120 and the population standard deviation is 5. Use $\alpha = 0.05$. If the ac-

SELF test

Virtual Classroom

Chat

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Guidelines: Unmute if you want to speak.

Blomax: What is positive please explain?

false positive

or false negative

falsse positive

ok

Confusion matrix

out accept H0 when H1 is true or Type II?

Accept A Type I: Reject H0 when it is true

Sending to everyone

Write Message

35. Consider the following hypothesis test:

$$H_0: p = .20$$

$$H_a: p \neq .20$$

A sample of 400 provided a sample proportion $\bar{p} = .175$.

- Compute the value of the test statistic.
- What is the p -value?
- At $\alpha = .05$, what is your conclusion?
- What is the rejection rule using the critical value? What is your conclusion?

SELF test

36. Consider the following hypothesis test:

$$H_0: p \geq .75$$

$$H_a: p < .75$$

A sample of 300 items was selected. Compute the p -value and state your conclusion for each of the following sample results. Use $\alpha = .05$.

- | | |
|--------------------|--------------------|
| a. $\bar{p} = .68$ | c. $\bar{p} = .70$ |
| b. $\bar{p} = .72$ | d. $\bar{p} = .77$ |

$$297.6 \pm 3.3$$

or

$$294.3 \text{ to } 300.9$$

This finding enables the quality control manager to conclude with 95% confidence that the mean distance for the population of golf balls is between 294.3 and 300.9 yards. Because the hypothesized value for the population mean, $\mu_0 = 295$, is in this interval, the hypothesis testing conclusion is that the null hypothesis, $H_0: \mu = 295$, cannot be rejected.

Note that this discussion and example pertain to two-tailed hypothesis tests about a population mean. However, the same confidence interval and two-tailed hypothesis testing relationship exists for other population parameters. The relationship can also be extended to one-tailed tests about population parameters. Doing so, however, requires the development of one-sided confidence intervals, which are rarely used in practice.

NOTES AND COMMENTS

We have shown how to use p -values. The smaller the p -value the greater the evidence against H_0 and the more the evidence in favor of H_a . Here are some guidelines statisticians suggest for interpreting small p -values.

- Less than .01—Overwhelming evidence to

- Between .01 and .05—Strong evidence to conclude H_a is true.
- Between .05 and .10—Weak evidence to conclude H_a is true.
- Greater than .10—Insufficient evidence to conclude H_a is true.

Find

type

Previous

Next

Virtual Classroom

Chat

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HOBhimsen Joshi
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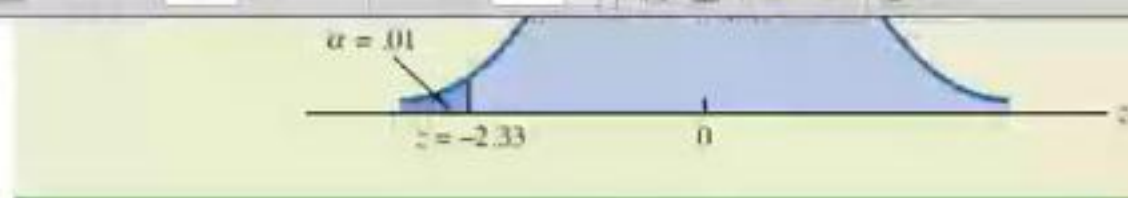
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Confusion ma

but accept H0
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Type I: Reject
It is trueSending to everyone
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Previous Next

We can generalize the rejection rule for the critical value approach to handle any level of significance. The rejection rule for a lower tail test follows.

REJECTION RULE FOR A LOWER TAIL TEST: CRITICAL VALUE APPROACH

Reject H_0 if $z \leq -z_\alpha$

where $-z_\alpha$ is the critical value; that is, the z value that provides an area of α in the lower tail of the standard normal distribution.

The p -value approach to hypothesis testing and the critical value approach will always lead to the same rejection decision; that is, whenever the p -value is less than or equal to α , the value of the test statistic will be less than or equal to the critical value. The advantage of the p -value approach is that the p -value tells us *how* significant the results are (the observed level of significance). If we use the critical value approach, we only know that the

Virtual Classroom

Chat

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Dattatraya Uday

H0

Dhruven Joshi

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please explai

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Confusion ma

but accept H0

or Type II?

Ravi A

Type I: Reject

it is true

Sending to everyone

Write Message

TABLE 8.7 SALES DATA FOR GULF REAL ESTATE PROPERTIES

Gulf View Condominiums			No Gulf View Condominiums		
List Price	Sale Price	Days to Sell	List Price	Sale Price	Days to Sell
495.0	475.0	130	217.0	217.0	182
379.0	350.0	71	148.0	135.5	338
529.0	519.0	85	186.5	179.0	122
552.5	534.5	95	239.0	230.0	150
334.9	334.9	119	279.0	267.5	169
550.0	505.0	92	215.0	214.0	58
169.9	165.0	197	279.0	259.0	110
210.0	210.0	56	179.9	176.5	130
975.0	945.0	73	149.9	144.9	149
314.0	314.0	126	235.0	230.0	114
315.0	305.0	88	199.8	192.0	120
885.0	800.0	282	210.0	195.0	61
975.0	975.0	100	226.0	212.0	146
469.0	445.0	56	149.9	146.5	137

WEB file
GulfProp

p -value does not provide much support for the null hypothesis, but is it small enough to cause us to reject H_0 ? The answer depends upon the level of significance for the test.

As noted previously, the director of the FTC's testing program selected a value of .01 for the level of significance. The selection of $\alpha = .01$ means that the director is willing to tolerate a probability of .01 of rejecting the null hypothesis when it is true as an equality ($\mu_0 = 3$). The sample of 36 coffee cans in the Hilltop Coffee study resulted in a p -value = .0038, which means that the probability of obtaining a value of $\bar{x} = 2.92$ or less when the null hypothesis is true as an equality is .0038. Because .0038 is less than $\alpha = .01$, we reject H_0 . Therefore, we find sufficient statistical evidence to reject the null hypothesis at the .01 level of significance.

We can now state the general rule for determining whether the null hypothesis can be rejected when using the p -value approach. For a level of significance α , the rejection rule using the p -value approach is as follows:

REJECTION RULE USING p -VALUE

Reject H_0 if $p\text{-value} \leq \alpha$

TABLE 9.1 ERRORS AND CORRECT CONCLUSIONS IN HYPOTHESIS TESTING

		Population Condition	
		H_0 True	H_a True
Conclusion	Accept H_0	Correct Conclusion	Type II Error
	Reject H_0	Type I Error	Correct Conclusion

rejection of H_0 when H_a is true. Unfortunately, the correct conclusions are not always possible. Because hypothesis tests are based on sample information, we must allow for the possibility of errors. Table 9.1 illustrates the two kinds of errors that can be made in hypothesis testing.

The first row of Table 9.1 shows what can happen if the conclusion is to accept H_0 . If H_0 is true, this conclusion is correct. However, if H_a is true, we make a **Type II Error** that

Find type

Virtual Classroom v2

Chat

☐ Disable group or false negative

false positive

ok

Confusion matrix

but accept H_0 when or Type II?

Search A Type1: Reject H_0 it is true

Type1: not rejecting false

Stevens' post search matrix

yes

ok

Coming to everyone

Write Message

TABLE 9.1 ERRORS AND CORRECT CONCLUSIONS IN HYPOTHESIS TESTING

		Population Condition	
		H_0 True	H_a True
Conclusion	Accept H_0	Correct Conclusion	Type II Error
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Virtual Classroom

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ok

Confusion matrix, we kn

but accept H_0 when fals

or Type II?

Rajesh A

Type I: Reject H_0 if hypo

it is true

Type II: Not rejecting H_0

false

Shirwan Jishi

search matrix

yes

ok

Sending to everyone

Write Message

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Virtual Classroom

Chat

☐ Disable group chat or false negative

false positive

ok

Confusion matrix we know

but accept H_0 when false or Type II?

Rajesh A
Type I: Reject Null hypothesis it is true

Type II: Not rejecting H_0 false

Bhimsen Joshi
search matrix

yes

ok

Sending to everyone

Write Message

TABLE 9.1 ERRORS AND CORRECT CONCLUSIONS IN HYPOTHESIS TESTING

		Population Condition	
		H_0 True	H_a True
Conclusion	Accept H_0	Correct Conclusion	Type II Error
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[The first row of Table 9.1 shows what can happen if the conclusion is to accept H_0 . If H_0 is true, this conclusion is correct. However, if H_a is true, we make a **Type II Error** that

1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.862
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.883
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.901
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.917
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.931
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.944
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.954
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.963
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.970
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.976
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.981
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.985
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.988
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.991
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.993
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.995
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.996
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.997
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990

but accept H0 when false or Type II?

Rajesh A
Type I: Reject Null hypothesis it is true

Type II: Not rejecting H0 when false

Bhimen Joshi
search matrix

yes

ok

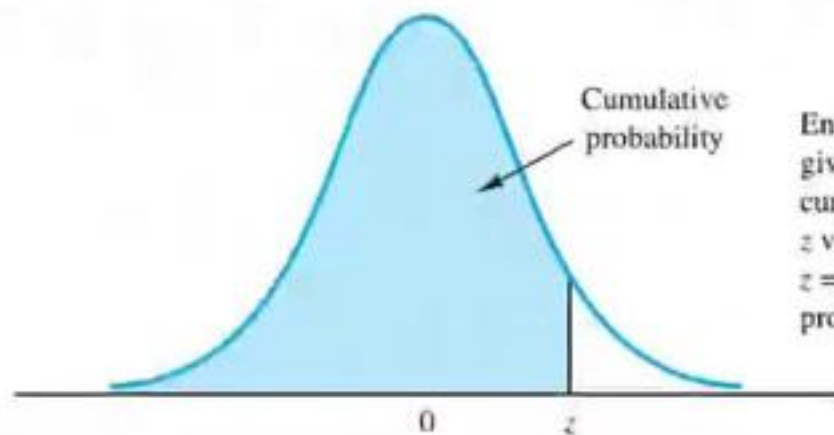
Biye Manoj Mathurkar
Type 2 - False Positive

Bhimen Joshi
ok thank you

Biye Manoj Mathurkar
Type 1 = False Negative

Sending to everyone
Write Message

CUMULATIVE PROBABILITIES FOR THE STANDARD NORMAL DISTRIBUTION



Entries in the table give the area under the curve to the left of the z value. For example, for $z = 1.25$, the cumulative probability is .8944.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879



z	.00	.01	.02	.03	.04	.05	.06	.07	
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997 .9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162 .9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306 .9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429 .9441

☐ Disable group chat

but accept H_0 when false is Type I or Type II?

Name:

Type I: Reject H_0 hypothesis when it is true

Type II: Not rejecting H_0 when it is false

Answer just
search matrix

yes

no

important! Macdonald

Type 2 - False Positive

Answer just

ok thank you

Macdonald/Macdonald

Type I = False-Negative

Group chat window

Group chat window

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Slide 11 of 23English (India)Accessibility: Investigate

Solution

English (United States)

English (India)

To switch input methods, press Windows key + space.

NotesComments

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Virtual Classroom

ChatParticipants (56)

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but accept H0 when false is Type I or Type II?

Rajesh A
Type1: Reject Null hypothesis when it is true

TypeII:Not rejecting Ho when it is false

Bhimsen joshi
search matrix

yes

ok

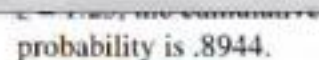
Barje Manoj Madhukar
Type 2 - False Positive

Bhimsen joshi
ok thank you

Barje Manoj Madhukar
Type 1 = False Negative

Sending to everyone

Write Message



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441

Problem

Young Adult magazine states the following hypotheses about the mean age of its subscribers. If $H_0: \mu = 28$, $H_a: \mu \neq 28$

If the manager conducting the test will permit a 0.15 probability of making a Type II error when the true mean age is 29, what sample size should be selected? Assume $\sigma = 6$ and a 0.05 level of significance.

Type-II error: Accept H_0 when it is false

$$H_0: \mu = 28 \quad H_1: \mu \neq 28$$

$$\alpha = 0.05$$

$$Z_{\alpha/2} = Z_{0.025} = 1.96$$

$$\beta_{0.15} = 1.04$$

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \sigma^2}{(\mu_1 - \mu_0)^2}$$

☐ Disable group chat

typenur rejecting mu when it is false

Bhroes Joshi
search matrix

yes

ok

Birje Manoj Mathurkar
Type 2 - False Positive

Bhroes Joshi
ok thank you

Birje Manoj Mathurkar
Type 1 - False Negative

Das Aniya Kumar
Yes

Bhroes Joshi
yes

324

Sending to everyone
Write Message

Problem

During the 2003 season, Major League Baseball took steps to speed up the play of baseball games in order to maintain fan interest (CNN Headline News, September 30, 2003). The following results come from a sample of 60 games played during the summer of 2002 and a sample of 50 games played during the summer of 2003. The sample mean shows the mean duration of the games included in each sample.

2002 Season	2003 Season
$n_1 = 60$	$n_2 = 50$
$\bar{x}_1 = 2 \text{ hours, } 52 \text{ minutes}$	$\bar{x}_2 = 2 \text{ hours, } 46 \text{ minutes}$

- A research hypothesis was that the steps taken during the 2003 season would reduce the population mean duration of baseball games. Formulate the null and alternative hypotheses.
- What is the point estimate of the reduction in the mean duration of games during the 2003 season?
- Historical data indicate a population standard deviation of 12 minutes is a reasonable assumption for both years. Conduct the hypothesis test and report the p -value. At a .05 level of significance, what is your conclusion?
- Provide a 95% confidence interval estimate of the reduction in the mean duration of games during the 2003 season.

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Type 1 = False Negative

Das Aniya Kumar

Yes

Bhimsen Joshi

yes

324

Dattatraya Udepurao Kulk...

beta will come down

Das Aniya Kumar

29

Bhimsen Joshi

380

Biju M

380

Bhimsen Joshi

ok understood

yes

Sending to everyone

Write Message



Problem

During the 2003 season, Major League Baseball took steps to speed up the play of baseball games in order to maintain fan interest (CNN Headline News, September 30, 2003). The following results come from a sample of 60 games played during the summer of 2002 and a sample of 50 games played during the summer of 2003. The sample mean shows the mean duration of the games included in each sample.

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- Provide a 95% confidence interval estimate of the reduction in the mean duration of games during the 2003 season.

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Divy Manoj Mathur
Sir, in previous problems its ok to say that with increase in sample size probability of False Positive is decreasing. However in general its totally based on Data.

is that correct?

Divy Manoj Mathur
2 sample t

Divy Manoj Mathur
without sd?

Divy Manoj Mathur
We will move towards more accurate data with increase in sample size

Divy Manoj Mathur
H0 is mean didn't change

Divy Manoj Mathur
ok sir

Sending to everyone
Write Message

- 1
- 2
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- 8
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- 10
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- 17

Problem

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2002 Season	2003 Season
$n_1 = 60$	$n_2 = 50$
$\bar{x}_1 = 2 \text{ hours, } 52 \text{ minutes}$	$\bar{x}_2 = 2 \text{ hours, } 46 \text{ minutes}$

- a. A research hypothesis was that the steps taken during the 2003 season would reduce the population mean duration of baseball games. Formulate the null and alternative hypotheses.
- b. What is the point estimate of the reduction in the mean duration of games during the 2003 season?
- c. Historical data indicate a population standard deviation of 12 minutes is a reasonable assumption for both years. Conduct the hypothesis test and report the p -value. At a .05 level of significance, what is your conclusion?
- d. Provide a 95% confidence interval estimate of the reduction in the mean duration of games during the 2003 season.

Virtual Classroom

Chat Participants (55)

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is that correct? 10:07 pm

Dinshaya Ullappa... 2 sample t. 10:07 pm

Bhimsen Joshi without sd? 10:07 pm

Bijay Manoj Madhukar We will move towards more accurate data with increase in sample size. 10:07 pm

Bhimsen Joshi H0 is mean didnot change 10:07 pm

Bijay Manoj Madhukar ok sir 10:07 pm

yes sir 10:07 pm

K GIRISH GOPINATHAN JOINED

Bhimsen Joshi H1 mean < 2.52 10:07 pm

Sending to everyone Write Message

Webinar-3 - PowerPoint

FileHomeInsertDrawDesignTransitionsAnimationsSlide ShowReviewViewHelpTell me what you want to do

Def...1234567891011121314151617

Problem

During the 2003 season, Major League Baseball took steps to speed up the play of baseball games in order to maintain fan interest (CNN Headline News, September 30, 2003). The following results come from a sample of 60 games played during the summer of 2002 and a sample of 50 games played during the summer of 2003. The sample mean shows the mean duration of the games included in each sample.

2002 Season	2003 Season
$n_1 = 60$	$n_2 = 50$
$\bar{x}_1 = 2 \text{ hours, } 52 \text{ minutes}$	$\bar{x}_2 = 2 \text{ hours, } 46 \text{ minutes}$

- A research hypothesis was that the steps taken during the 2003 season would reduce the population mean duration of baseball games. Formulate the null and alternative hypotheses.
- What is the point estimate of the reduction in the mean duration of games during the 2003 season?
- Historical data indicate a population standard deviation of 12 minutes is a reasonable assumption for both years. Conduct the hypothesis test and report the p -value. At a .05 level of significance, what is your conclusion?
- Provide a 95% confidence interval estimate of the reduction in the mean duration of games during the 2003 season.

Slide 12 of 23English (India)Accessibility: Investigate

virtual Classroom

ChatParticipants (56)

☐ Disable group chat

without sd?

Biye Mancy Madhusar
We will move towards more accurate data with increase in sample size

Blissam Joshi
H0 is mean didnot change

Biye Mancy Madhusar...
ok sir

yes sir

K GIRISH GOPINATHAN JOINED

Blissam Joshi
H1 mean < 2.52

ok... $x_1 - x_2 > 0$ we can take

Dattaraya Udapirao Kid...
difference > 0 is fine

RAHUL KUMAR KALSHIK JOINED

Sending to everyone

Write Message

NotesComments

ENG IN8:34 PM2/8/2022

Problem

During the 2003 season, Major League Baseball took steps to speed up the play of baseball games in order to maintain fan interest (CNN Headline News, September 30, 2003). The following results come from a sample of 60 games played during the summer of 2002 and a sample of 50 games played during the summer of 2003. The sample mean shows the mean duration of the games included in each sample.

2002 Season

$$\begin{aligned} n_1 &= 60 \\ \bar{x}_1 &= 2 \text{ hours, } 52 \text{ minutes} \\ &= 172 \text{ min} \end{aligned}$$

2003 Season

$$\begin{aligned} n_2 &= 50 \\ \bar{x}_2 &= 2 \text{ hours, } 46 \text{ minutes} \\ &= 166 \text{ min} \end{aligned}$$

- A research hypothesis was that the steps taken during the 2003 season would reduce the population mean duration of baseball games. Formulate the null and alternative hypotheses.
- What is the point estimate of the difference in the mean duration of games during the 2003 season?
- Historical data indicate a population standard deviation of 12 minutes is a reasonable assumption for both years. Conduct the hypothesis test and report the p -value. At a .05 level of significance, what is your conclusion?
- Provide a 95% confidence interval estimate of the reduction in the mean duration of games during the 2003 season.

Chat

Participants (56)

☐ Disable group chat

without sd?

Biye Manoj Mathias
We will move towards more accurate data with increase in sample size

Blumen joshi
H0 is mean didnot change

Biye Manoj Mathias...
ok sir

yes sir

K GRISH GOPINATHAN JOINED

Blumen joshi
H1 mean < 2.52

ok... $x_1 - x_2 > 0$ we can take

Dattatraya Udayarao Kulk...
difference > 0 is fine

RAHUL KUMAR KAUSHIK JOINED

Sending to everyone
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Problem

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Dattatraya Udagaprao Kul...
difference > 0 is fine
8:37 pm

RAHUL KUMAR KAUSHIK JOINED

Saravani J

z

8:37 pm

Das Aniya Kumar

t2

8:38 pm

Biju M

paired t

8:38 pm

Dattatraya Udagaprao...

z

8:38 pm

Saravani J

z test

8:38 pm

0

8:38 pm

Das Aniya Kumar

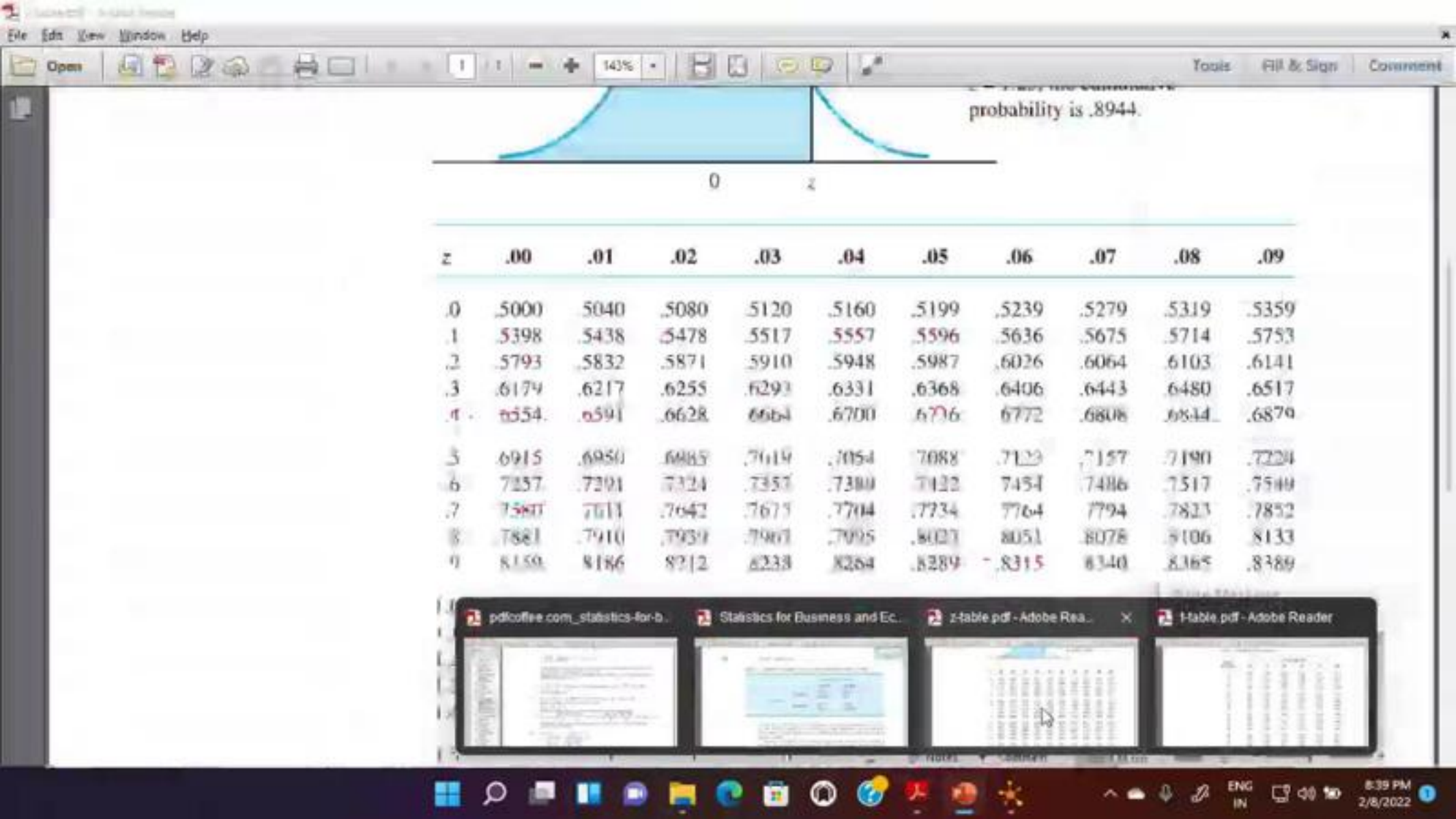
12

8:38 pm

Sending to everyone

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Problem

Are nursing salaries in Tampa, Florida, lower than those in Dallas, Texas? Salary data show staff nurses in Tampa earn less than staff nurses in Dallas (*The Tampa Tribune*, January 15, 2007). Suppose that in a follow-up study of 40 staff nurses in Tampa and 50 staff nurses in Dallas you obtain the following results.

	Tampa	Dallas
$n_1 = 40$	$n_2 = 50$	
$\bar{x}_1 = 56100$	$\bar{x}_2 = 59400$	
$s_1 = 6000$	$s_2 = 7000$	

- Formulate hypothesis so that, if the null hypothesis is rejected, we can conclude that salaries for staff nurses in Tampa are significantly lower than for those in Dallas. Use $\alpha = .05$.
- What is the value of the test statistic?
- What is the p -value?
- What is your conclusion?

1 new notification

Chat

Participants (54)

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Saravanan J
2:511

zero

Bhraman joshi
one

Saravanan J
one tailed

Biju M
one tailed

Saravanan J
reject ho

1.645

Rajesh A
1.645

Saravanan J
2003 will reduce

Sending to everyone
Write Message

Solution

here $n_1 = 40$, $n_2 = 50$
 $\bar{x}_1 = 56100$, $\bar{x}_2 = 59400$
 $s_1 = 6000$ $s_2 = 7000$

Virtual Classroom

Chat Participants (54)

☐ Disable group chat

Biju M
one tailed
1:00 pm

Saravanan J
reject ho
1:00 pm

1.645
1:00 pm

Rajesh A
1.645
1:00 pm

Saravanan J
2003 will reduce
1:00 pm

Dattatraya Udaynar K...
1 tailed, 2 sample t
1:00 pm

Saravanan J
two mean and t-test
1:00 pm

yes
1:00 pm

Das Aniya Kumar
-2.40
1:00 pm

Sending to everyone
Write Message

Problem

Bank of America's Consumer Spending Survey collected data on annual credit card charges in seven different categories of expenditures: transportation, groceries, dining out, household expenses, home furnishings, apparel, and entertainment (*US Airways Attaché*, December 2003). Using data from a sample of 42 credit card accounts, assume that each account was used to identify the annual credit card charges for groceries (population 1) and the annual credit card charges for dining out (population 2). Using the difference data, the sample mean difference was $\bar{d} = \$850$, and the sample standard deviation was $s_d = \$1123$.

- Formulate the null and alternative hypotheses to test for no difference between the population mean credit card charges for groceries and the population mean credit card charges for dining out.
- Use a .05 level of significance. Can you conclude that the population means differ? What is the p -value?
- Which category, groceries or dining out, has a higher population mean annual credit card charge? What is the point estimate of the difference between the population means? What is the 95% confidence interval estimate of the difference between the population means?

Saravanan J

2003 will reduce

0:42 am

Dattatraya Udayrao K...

1 tailed, 2 sample t

0:43 am

Saravanan J

two mean and t-test

0:43 am

yes

0:43 am

Das Ananya Kumar

-2.40

0:44 pm

V R Liju

-2.40

0:44 pm

Das Ananya Kumar

reject

0:44 pm

SINDIA P CHOOLACKAL JOINED

Bhimen Joshi

 $u1 - u2 = 0$

0:44 pm

yea

0:44 pm

Sending to everyone

Write Message



Solution

let μ_1 = Population mean grocery

μ_2 = Population mean dining out

$$H_0: \mu_d = 0$$

$$H_a: \mu_d \neq 0$$

$$t = \frac{\bar{d} - \mu_0}{s_d / \sqrt{n}} = \frac{856 - 0}{1123 / \sqrt{42}} = 4.91$$

$$df = 42 - 1 = 41$$

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ToolsFill & SignComment

TABLE 2t DISTRIBUTION (Continued)

Degrees of Freedom	Area in Upper Tail					
	.20	.10	.05	.025	.01	.005
35	.852	1.306	1.690	2.030	2.438	2.724
36	.852	1.306	1.688	2.028	2.434	2.719
37	.851	1.305	1.687	2.026	2.431	2.715
38	.851	1.304	1.686	2.024	2.429	2.712
39	.851	1.304	1.685	2.023	2.426	2.708
40	.851	1.303	1.684	2.021	2.423	2.704
41	.850	1.303	1.683	2.020	2.421	2.701
42	.850	1.302	1.682	2.018	2.418	2.698
43	.850	1.302	1.681	2.017	2.416	2.695
44	.850	1.301	1.680	2.015	2.414	2.692
45	.850	1.301	1.679	2.014	2.412	2.690
46	.850	1.300	1.679	2.013	2.410	2.687
47	.850	1.300	1.678	2.012	2.409	2.685

pdfcoffee.com_statistics-for-b...

Statistics for Business and Ec...

t-table pdf - Adobe Reader

t-table.pdf - Adobe Rea...

53

2.418

1.308

1.674

2.006

2.409

2.673

ENG IN

8:52 PM

2/8/2022

Solution

let μ_1 = Population mean grocery

μ_2 = population mean dining out

$$H_0: \mu_d = 0$$

$$H_a: \mu_d \neq 0$$

$$t = \frac{\bar{d} - \mu_0}{s_d / \sqrt{n}} = \frac{856 - 0}{1123 / \sqrt{42}} = 4.91$$

$$d.f. = 42 - 1 = 41$$

$$\alpha = 0.05$$

$$t_{\alpha} = 2.020$$

Reject H_0 .

$$d \pm t_{0.025} \frac{s_d}{\sqrt{n}} = 856 \pm$$

Solution

let μ_1 = Population mean grocery

μ_2 = Population mean dining out

$$H_0: \mu_d = 0$$

$$H_a: \mu_d \neq 0$$

$$t = \frac{\bar{d} - \mu_0}{s_d / \sqrt{n}} = \frac{850 - 0}{1123 / \sqrt{42}} = 4.91$$

$$d.f. = 42 - 1 = 41$$

$$\alpha = 0.05$$

$$t_{\alpha} = 2.020$$

Reject H_0 .

☐ Disable group chat

Uts Arniya Kumar

Yes

Shivani Joshi

4.905

tec

Das Arniya Kumar

2 tailed

Sarevanan j

2 tail

Birje Manoj Madhu...

2

Raesh A

2 tailed

Das Arniya Kumar

reject H_0

ja

Yes

Sending to everyone

Write Message





Solution



Virtual Classroom

Chat

Participants

☐ Disable group chat

Birje Manoj Madhu...
2
8:52 pm

Rajesh A
2 tailed
8:54 pm

Das Aniya Kumar
reject H0
8:56 pm

! =
8:58 pm

Yes
8:59 pm

Saravanan J
yes
8:59 pm

Birje Manoj Madhu...
yes sir
8:59 pm

Varsha jetley
please post solution with problem
8:59 pm

Das Aniya Kumar
tables also please share..
8:59 pm

2 minutes

Sending to everyone
Write Message

Yes

No

Yes

Attention

The lecture is over.
Recording will be
available shortly.

OK

Thank you for attending this lecture
session. Have nice week ahead.
Take care.

Dr. Anil Kumar
Time out Sir

Send Message
Write Message

Solution

$$\bar{P}_1 - \bar{P}_2 = 0.64 - 0.58 = 0.06$$

Professional golfers make 6% putts more
than amateur

$$P_1 - P_2 +$$



1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9903	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9947	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990