

Friendly Introductory Statistics Help (Version 3.0.3)

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Statisfaction Guaranteed (with 95% Confidence)

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Prepared by Holly Raffle

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1 Introduction and Features

Friendly Introductory Statistics Help (FISH) is designed as a free, easy-to-use program for use by both students and instructors. The software's features make it an excellent teaching tool for secondary school, undergraduate and graduate level introductory statistics courses. For teaching purposes, FISH generates sample sets of data from a population defined by the user with a random data generator. This allows instructors to provide tangible demonstrations of abstract concepts such as the central limit theorem and sampling error. Because of FISH also allows users to manually enter data sets, it is appropriate for students to use as a self-paced tutorial package. The step-by-step presentation and the easily accessible "help" buttons allow students to use FISH as an independent study of basic statistical concepts.

FISH allows users to:

<u>Analyze One Variable.</u> This option calculates the mean, deviation scores, squared deviation scores, sum of the squared deviation scores, variance, standard deviation, z-scores, standard error, median, and range.

Within this option, the user is able to toggle between the above calculations computed with (N - 1) for sample statistics and (N) for population parameters.

This option also allows the user to view a graphical representation of the results. Users are able to access frequency tables (with toggles allowing raw scores, z-scores, and both raw and z-scores to be shown) and grouped frequency tables.

When the user chooses to generate random data, the histogram feature is enhanced to allow the user to view the sampling distribution of the mean. From this screen, the user can generate additional samples in multiples of 1, 10, 100 or 10,000. These sample means are then added to the existing sampling distribution of the mean.

<u>Analyze Two Variables.</u> This option calculates the means, standard deviations, deviation scores, and cross products for both variables. Additionally, the unstandardized correlation coefficient (covariance), correlation coefficient, coefficient of determination (R²), regression coefficient (slope) and Y-intercept are calculated. As in the Analyze One Variable option, the user is able to toggle between the above calculations computed with (N - 1) for sample statistics and (N) for population parameters.

This option also allows the user to view a graphical representation of the results. Users are able to access scatterplots (with toggles allowing raw scores, z-scores, and both raw and z-scores to be shown) and have the option to show or hide the mean lines and the regression line. The histogram option also shows the regression equation and the values for the correlation coefficient and the coefficient of determination. Additionally, the user has access to observed, predicted, and residual values as well as a calculation of the standard error of the estimate.

When the user chooses to generate random data, the scatterplot feature is enhanced to allow users to draw another sample from the population. Upon drawing another sample, the new scatterplot of the data is displayed and the user can proceed through the options listed above.

2 Installation and Setup

FISH operates in any Windows environment. To install FISH:

- 1. Insert the CD-ROM into the proper drive.
- 2. View the contents of the CD-ROM using Windows Explore.
- 3. Click on the FISH icon. The program will launch and you are ready to begin.

3 Data Management

FISH provides a simple method of entering data for analysis. Data is entered directly into FISH and can be saved as a text file for future use.

Entering Data into FISH

💱 FISH: Friendly Introducto	ry Statistics Help			
File Analysis Options Help				
New Data (Reset Completely) Ct	rl+N	Do All 10 Steps Save Change	s Sort by Bank	View Historram
Open Data File saved by FISH Ct	rl+O Set Spreadsheet			
Save Data File Ct	rl+s			
Exit	rl+F4			
Enter Data DONE	Calculate M 1. Und	er FILE, Select New Data ((Reset Completel	y)
Generate Random Data	Help			
STEP 3: Calculate Deviation Scores	STEP 4: Square the Deviation Scores			
Help Do It	Help Do It			
STEP 5	STEP 6			
Sum the Squared	Calculate Average Sum			
Help Do It	Help Do It	COLUMN STATISTICS, using	g variance formulas	with N-1:
STEP 7	STEP 8			
Take Square Root of Variance	Calculate Z-Scores for each Case			
Help Do It	Help Do It			_
STEP 9 Calculate Standard Error	STEP 10 Calculate Median and Range			
Help Do It	Help Do It			

😻 FISH: Friendly Introductor	y Statistics Help				
File Analysis Options Help					
NU • Analyze 1 Variable (Calculate Analyze 2 Variables (Calculate	Mean & SD) Ctrl+F1 e Correlation) Ctrl+F2	eet Do All 10 Steps	Save Changes	Sort by Rank	View Histogram
ANALYSES STEP 1 Enter Data DONE or	STEP 2 Calculate Mean	2. Choose the ty the	pe of analysis ANALYSIS pull	you wish to pe -down menu.	erform using
Generate Handom Data STEP 3: Calculate Deviation Scores Help Do It	STEP 4: Square the Deviation Scores Help Do It				
STEP 5 Sum the Squared Deviation Scores Help Do It	STEP 6 Calculate Average Sum of Squares Help Do It		TISTICS, using vi	ariance formulas	with N-1:
STEP 7 Take Square Root of Variance Help Do It	STEP 8 Calculate Z-Scores for each Case Help Do It				
STEP 9 Calculate Standard Error Help Do It	STEP 10 Calculate Median and Range Help Do It				



W FISH: Friendly Introductory Statistics Help				
File Analysis Options Help				
NUMBER OF CASES	Do All 10 Steps	Save Changes	Sort by Rank	View Histogram
N=10 Use 100 Use 1000 Use 10000 Reset	Case # Data	× I		
ANALYSES STEP 1 Enter Data DONE Calculate Mean	1 2 3			
Generate Random ata Help Do It	4			
STEP 3: STEP 4: Calculate Deviation Scores Scores	6 7			
6. When data entry is complete, click the DONE button. Bornation course	8 9 10			
Help Do It Help Do It	COLUMN STA	TISTICS, using vi	ariance formulas	<u>with N-1=9;</u>
STEP 7 STEP 8 Take Square Root of Variance Calculate Z-Scores for each Case Help Do It STEP 9 STEP 10 Calculate Standard Error Calculate Median and	5. Enter You Note: In	data in the col u must enter nu the 2 variable enter DATA ()	umn marked [umeric data. analysis optio () and DATA (Y	DATA (X). n, you must ′).
Hange Help Do It Help Do It				

Saving a FISH Data File

👹 FISH: Friendly Introductor	y Statistics Help					
File Analysis Options Help						
New Data (Reset Completely) Ctr	1+N	Do All 10	Steps	Save Changes	Sort by Rank	View Histogram
Open Data File saved by FISH Ctr Save Data File Ctr	I+O 000 Reset	Case #	Data (X	a 1 – T		
Exit Ctr	1+F4	1	75	2	1/2	
STEP 1	STEP 2	2	69	-		
Enter Data DONE	Calculate Mean	3	90			
Or	Help Do It	4	77			
		5	70			
Cal can be saved as	en entered into FISH, it	6	77			
FILE and	SAVE DATA FILE.	7	82			
Непр рол	пор рол	8	84			
STEP 5	STEP 6	9	64			
Sum the Squared Deviation Scores	Calculate Average Sum of Squares		89			
Help Do It	Help Do It			STICS, using ve	ariance formulas	<u>with N-1=9:</u>
STEP 7	STEP 8					
Take Square Root of Variance	Calculate Z-Scores for each Case		-			
Help Do It	Help Do It					
STEP 9 Calculate Standard Error	STEP 10 Calculate Median and Range					
Help Do It	Help Do It					

Opening a Saved FISH Data File



4 Using the Random Data Generator

For users who are demonstrating the use of the software to colleagues, teaching introductory statistics courses, or completing various assignments, FISH generates sample sets of data using a random seed. The user can modify population information for Variable X (and Variable Y, if using the Two Variable Analysis Option) by simply pointing, clicking, and completing the required data fields.

FISH allow users to input the following information: mean, standard deviation, number of observations (N), and minimum and maximum scores. Additionally, FISH allows users to select from the following distributions: normal, bimodal, random, uniform, leptokurtic, platykurtic and positively and negatively skewed.

<u>To use the data generator</u>, begin by completing steps 1-4 in "Entering Data into FISH", which can be found on pages 4 and 5 of this manual.

FISH: Friendly Introductory Statistics Help					
File Analysis Options Help					
NUMBER OF CASES	Do All 10	Steps	Save Changes	Sort by Rank	View Histogram
	Case #	Data (X	()		
ANALYSES STEP 1 STEP 2 Enter Data DONE Calculate Mean	1 2 3				
Generate Random Data Help Do It	4	_			
STEP 3: Calculate Deviation Scores	6 7			1	
Help Do It 1. To begin data gene RAND	eration, o	lick on A.	GENERATE		
STEP 5 5 Sum the Squared Carcurate Average Sum Deviation Scores of Squares	COLUMI		ISTICS. usina v	ariance formulas	with N-1=9:
Help Do It Help Do It		1	2012		
STEP 7 STEP 8 Take Square Root of Calculate Z-Scores for Variance each Case					
Help Do It Help Do It					
STEP 9 STEP 10 Calculate Standard Error Calculate Median and Range Help Do It					

Generate Data	
Seed for Data Generator SEED = 255053 Population Information for Variable X Mean SD N 75 10 10 Restrictions # Decimals: 0 Minimum Score: Maximum Score:	2. The data generator is set by a SEED number. FISH will randomly select a SEED number each time the data generator is opened. Note: If you wish to recreate the same data set or would like students to have the same random data set, either enter (and remember!) your own SEED value, or record the SEED value randomly selected by FISH.
Distribution:	3. Enter the POPULATION
Normal Ouniform Positively Skewed Negatively Skewed Positive Kurtosis Bimodal Random	INFORMATION FOR VARIABLE X. Note: If you would like to enter a minimum and/or maximum value for X, check the appropriate box.
X Cancel	✓ OK ← 4. Click OK to continue.

For users choosing the Analyze Two Variables option, the data generator will appear in the following manner:

Seed for Data Generator Population Correlation between X & Y SEED = 940821 Population Correlation = .50 Population Information for Variable X Population Information for Variable Y Mean SD 15 3 15 3 Restrictions # Decimals: Minimu Note that the data generator is essentially the same as the single variable case. A key difference is that the user can enter the population correlation between X and Y.	Generate Data			
Population Information for Variable X Mean SD N 15 3 10 Restrictions # Decimals: 0 Minimu Maxim Distu Note that the data generator is essentially the same as the single variable case. A key difference is that the user can enter the population correlation between X and Y.	SEED = 9404	321	Population Correlation t	.50
Normal	Population Information for V <u>Mean</u> <u>SD</u> 15 3 Restrictions # Decimals Minimu Maxim Distu O Normal	te that the data as the single v is that the user correlatio	Population Information I Mean SI 15 3 Restrictions # Decimals: generator is essential ariable case. A key d can enter the popula n between X and Y.	ally the ifference
C Positively Skewed C Positively Skewed C Positively Skewed C Negatively Skewed C Positive Kurtosis C Negative Kurtosis C Positive Kurtosis C Negative Kurtosis C Bimodal C Random C Bimodal C Random	C Positively Skewed C C Positive Kurtosis C C Bimodal C	Negatively Skewed Negative Kurtosis Random	C Positively Skewed C Positive Kurtosis C Bimodal	 ○ Negatively Skewed ○ Negative Kurtosis ○ Random

Data generated by FISH can be saved as a text file and for future use by following the procedure outlined on pages 6 and 7 of this manual.

5 Analyzing One Variable Using a FISH Data File

This option calculates the mean, deviation scores, squared deviation scores, sum of the squared deviation scores, variance, standard deviation, z-scores, standard error, median, and range.

To use the ANALYZE ONE VARIABLE option using a FISH data file, either enter the data directly into the program using the procedure described on pages 4 through 6 of this manual or open an existing FISH data file using the procedure described on page 7 of this manual.

Once the data file is complete, it is easy to follow along as FISH computes the necessary calculations. As you work through the calculations, be sure to take advantage of the special features that FISH offers.

👹 FISH: Friendly Introductor	ry Statistics Help					
File Analysis Options Help						
NUMBER OF CASES	()	Do All 10	Steps	Save Changes	Sort by Rank	View Histogram
N=10 Use 100 Use 1000	Use 10000 Reset	Case #	Data (>	0		
ANALYSES		1	86			
STEP 1	STEP 2	2	60			
Or DUNE		3	58			
Generate Random Data	Help Do It	4	75			
STEP 3	STEP 4	5 To p	erform	the calculation	on(s) indicate	d in
Saculate Deviation	Square the Deviation		each S	TEP, click the	DO IT button.	ð
		/	76			
the HELP buttons	the SIEPS 2 - 10, use	8	67		151	
formulas, helpful	explanations, and	10	82			
additional	examples.					
Help Do It	Help Do It			ISTICS, using vi	ariance formulas	<u>with N-1=9;</u>
STEP 7	STEP 8		21			
Take Square Root of Variance	Calculate Z-Scores for each Case		- 23			
Help Do It	Help Do It					
STEP 9 Calculate Standard Error Help Do It	STEP 10 Calculate Median and Range Help Do It					



👹 FISH: Friendly Introductor	y Statistics Help						
File Analysis Options Help							
NUMBER OF CASES	[Do All 10	Steps S	ave Changes	Sort by	Rank	View Histogram
	Use 10000 Heset	Case #	Data (X)	(X-M)	M)(X-M)	Z score	Rank
ANALYSES		1	67	-6.300	35,690	-0.596	4.500
STEP 1	STEP 2	2	65	-8.300	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0.705	2500
Enter Data DONE	Laiculate Mean	3	78	4.700	After	hanges	have been
Or	Help Dolt	4	65	-8.300	made, o	E CHANGES.	
Luenerate Handom Data		5	67	-6.300	FISH will automaticall recalculate statistics ba on the data changes.		
STEP 3:	STEP 4:	6	71	-2.300			
Scores If you wo	ould like to change data fo	ra	76	2.700		1992 AN 1992 M	-
Help Case at	any time, click on the DAT	A	62	-11.300	127.690	-1.069	1.000
Then, ma	ke anv necessarv changes	or	91	17.700	313.290	1.674	9.500
STEP 5	corrections.		91	17.700	313.290	1.674	9.500
Deviation Scores	of Squares	-	10				
Help Do It	Help Dolt		STATIST	TCS, using v	variance f	ormulas v	<u>vith N-1=9:</u>
		Sum:	733.000	0.000	1006.100	1	
STEP 7	STEP 8	Mean (M):	73.300	0.000		0.000	
Variance	each Case	Variance:			111.789		
Help Dolt	Help Do It	Std Dev:			10.573	1.000	
		Std Error:			3.343		
STEP 9	STEP 10	Median:	69.000				5.500
Calculate Standard Error	Range	Maximum:	91.000			1	
Help Do It	Help Do It	Minimum:	62.000				
		Range:	29.000				
						1.	

😻 FISH: Friendly Introductory S	tatistics Help						
File Analysis Options Help							
NUMBER OF CASES		Do All 10	Steps Sa	ve Change	Sort by	Rank	View Histogram
N=10 Use 100 Use 1000 U	Jse 10000 Reset	Case #	Data (X)	(TM)	[X-M][X-M]	Z score	Rank
ANALYSES		1	91.000	-6.300	39.690	-0.596	4.500
STEP 1	STEP 2		65.000	.8 300	68.890	-0.785	2.500
Enter Data DONE	OPT BY PANK button all		o rank vo		22.090	0.445	8.000
or data.	The button is a "toggle"	button a	nd will all	ow 0	68.890	-0.785	2.500
Generate Handom Data you to	rank and unsort the da	ta with a s	simple cli	ck 0	39.690	-0.596	4.500
STEP 3:	of the butto	n.		0	5.290	-0.218	6.000
Scores	Scores	1	76.000	2.700	7.290	0.255	7.000
Help Do It	Heln Dolt	8	62.000	-11.300	127.690	-1.069	1.000
		9	91.000	17.700	313.290	1.674	9.500
STEP 5	STEP 6	10	91.000	17.700	313.290	1.674	9.500
Deviation Scores	of Squares	-	26				
Help Do It	Help Dolt	COLUMN	STATISTI	<u>CS, using</u>	variance f	ormulas v	<u>vith N-1=9:</u>
		Sum:	733.000	0.000	1006.100	1	
STEP 7	STEP 8	Mean (M):	73.300	0.000		0.000	
Variance	each Case	Variance:			111.789		
Help Do It	Help Dolt	Std Dev:	2		10.573	1.000	
		Std Error:			3.343		
STEP 9	STEP 10 Calculate Median and	Median:	69.000				5.500
Calculate Standard Error	Range	Maximum:	91.000			1	
Help Dolt	Help Do It	Minimum:	62.000				
		Range:	29.000			1	

😻 FISH: Friendly Introductor	y Statistics Help						
File Analysis Options Help							
NUMBER 0 Use (N-1) for Calculation	ulations (sample) F7	Do All 10 9	Steps S	ave Change	s Sort by	Rank	View Histogram
	n Canalatian E10	Case #	Data (X)	(X-M)	(X-M)(X-M)	Z score	Rank
ANALYSES Use Z-scores for C	Correlation F9	1	67.000	-6.300	39.690	-0.628	4.500
STEP 1	Calculate Mean	K	65.000	-8.300	68.890	-0.827	2.500
DUNE	Calculate Mean	3	78.000	4.700	22.090	0.469	8.000
Generate Bandom Data	Help Do It	4	65.000	0 200	co oon	0.027	2 500
Help Dolt STEP 5 Sum the Squared Deviation Scores Help Dolt	Help Do It STEP 6 Calculate Average Sum of Squares Help Do It	selected, s FOR CAL parameters option and parameter	ample s CULATIO are cal d FISH a s for the	tatistics DNS is se culated. Ilows you same da select	will be cal elected, th Note that I to see th ata set by tion.	culated en pop this is a ne statis making	. If USE N ulation "toggle" tics and a simple
STEP 7	STEP 8	Sum:	733.000	0.000	1006.100	0.000	
Take Square Root of	Calculate Z-Scores for	Mean (M):	73.300	0.000	100 010	0.000	
Variance	each Case	Chil Dave	6		100.010	1.000	
Help Do It	Help Do It	Std Even	9 <u>7</u>		2 172	1.000	
STEP 9	STEP 10	Modian:	69.000	-	3.172	8	5 500
Calculate Standard Error	Calculate Median and	Mauinum:	03.000		-		5.500
1 - 1	Hange	Minimum:	62.000				
Help Do It	Help Do It	Pango:	29.000				
		In ange.	23.000				

😽 FISH: Friendly Introductor	y Statistics Help							
File Analysis Options Help								
NUMBER OF CASES	1	Do All 10	Steps S	ave Change:	Sort b	y Rank	View Histog	gram
	Use 10000 Heset	Case #	Data (X)	(X-M)	[X-M][X-M]	Zeon	Rank	
ANALYSES		1	144.000	1.467	2.151	0.065	18.500	
STEP 1	STEP 2	2	220.000	77.467	6001.084	3.431	30.000	
Enter Data DONE	Calculate Mean	3	120.000		20.554	0.201	11000	
or Generate Random Data	Help Do It STEP 4:	4 5 6	To tak capat	e advant bilities, cl	age of Fl ick VIEW	SH's gra HISTOG	Phics RAM.	
Scores	Scores	7	170.000	27.467	/54.418	1.216	28.000	
Help Do It	Help Do It	8	124.000	-18.533	343.484	-0.821	6.500	
		9	158.000	15.467	239.218	0.685	23.500	
STEP 5	STEP 6	10	154.000	11.467	131.484	0.508	22.000	Peril
Deviation Scores	of Squares		1.00.000	40.407	070.054	0.000	00 500	
Help	Help	COLUMN	STATIST	ICS, using	<u>variance</u> (ormulas	with N-1=29	<u>i</u>
		Sum:	4276.000	0.000	14787.5	1		
STEP 7	STEP 8	Mean (M):	142.533	0.000		0.000		
Take Square Root of Variance	Calculate Z-Scores for each Case	Variance:			509.913			
Hala Do It	Hele Do It	Std Dev:	35		22.581	1.000		-
Theip Do It	Theip Do it	Std Error:	12		4.123			-
STEP 9	STEP 10	Median:	141.000		-		15,500	-
Calculate Standard Error	Calculate Median and	Maximum:	220.000	8	-			-
		Minimum	110.000					-
Help Do It	Help Do It	Bange	110.000					-
		L'indrigo.	1.10.000	21	1.	18		



		Relative	Cumulative			
core	Frequency	Frequency	Frequency			
110.000	1	0.0333	0.0333			23
114.000	1	0.0333	0.0667			
116.000	1	0.0333	0.1000	After clicking VIEW	FREQUENCY TAE	LE,
120.000	2	0.0667	0.1667	this windo	w will appear.	
124.000	2	0.0667	0.2333			
125.000	1	0.0333	0.2667			
128.000	1	0.0333	0.3000			
130.000	2	0.0667	0.3667			
135.000	1	0.0333	0.4000			
136.000	1	0.0333	0.4333			
138.000	1	0.0333	0.4667			
140.000	1	0.0333	0.5000			
142.000	2	0.0667	0.5667			
144.000	2	0.0667	0.6333			
145.000	1	0.0333	0.6667			
150.000	1	0.0333	0.7000			
154.000	1	0.0333	0.7333			
158.000	2	0.0667	0.8000			
160.000	1	0.0333	0.8333			
162.000	2	0.0667	0.9000			
A				1		A



eal Interval	Midpoint	Frequency	Relative Frequency	Cumulative Frequency	2
109.50- 127.50	119	8	0.2667	0.2667	
127.50- 145.50	137	12	0.4000	0.6667	
145.50- 163.50	155	1	0.2333	0.9000	
163.50- 181.50	173	2	0.0667	0.9667	
181.50- 199.50	191	0	0.0000	0.9667	
199.50- 217.50	209	0	0.0000	0.9667	
217.50- 235.50	227	1	0.0333	1.0000	
		30	1.0000		
Į	After cl FREQUENCI	icking VIEW GF ES, this windov	ROUPED v will appear.]	
				1	

6 Analyzing One Variable Using the Random Data Generator

This option calculates the mean, deviation scores, squared deviation scores, sum of the squared deviation scores, variance, standard deviation, z-scores, standard error, median, and range using randomly generated data.

To use the ANALYZE ONE VARIABLE option using the random data generator, begin by generating data as described in pages 7 through 9 of this manual.

Once the data file is complete, it is easy to follow along as FISH computes the necessary calculations. Many of the features are the same when using the data generator. Please refer to pages 10 through 14 to review these features.

Using the random data generator enhances the histogram feature to allow the user to view the sampling distribution of the mean. From this screen, the user can generate additional samples in multiples of 1, 10, 100 or 10,000. These sample means are then added to the existing sampling distribution of the mean.

Analysis Options Help	Manager and Abrahama Adribitish a						-	
UMBER OF CASES	6 B	the witte	SMpt 3	ove Change	Sort by	Rank	View Histo	gan
-30 Ure 100 Vie 1000	Use 10000 Reset	Case #	Data (A)	(pK-M)	DC-MIDGMI	2	Rank	1
NALYSES		1	75	-1.033	1.068	-0.097	12,000	-1
STEP 1	STEP 2	2	72	-4.033	19 258	-0.377	11,000	
Enter Data DONE	Calculate Mean		100	2002		0.371	19,000	
DL	Frank Frank	Click on VI	EW HISTO	GRAM to	explore	-0.003	13,500	
Elenerate Rendom Elate	nep bon	the enha	nced his	togram fe	eatures	0.184	17,000	
STEP 3:	STEP 4:	associat	dener	ator.	m data	-0.937	9.000	
Calculate Deviation	Square the Deviation	1/	159	-17.033	1290134	-1 591	1.000	
		8	91	14 967	224.001	1 398	28,000	
Help Do II	пер	9	83	6.967	49 534	0.651	23,000	
STEP 5	STEP 6	10	81	4 967	24,669	0.454	20.000	
Sum the Squared	Calculate Average Sum	10	- man		4 444	* ***		
Deviation a dores	or squares	COLUMN	STATIST	ICS, using	variance fr	ormulas	with N-1=2	9
Help Doll	Help Doll	Surv	2281 000	0.000	3322 967		an weather the	23
STEP 7	STEP 8	Marc (M)	76 022	0.000	0000	0.000	-	-
Take Square Root of	Calculate 2-Scores for	Medarium	10.000	0.000	114 606	0.000	-	-
Variance	each Case	Sul Dec	-	-	10 704	1 000	-	-
Help Doll	Help Doll	SID Dev.	-		10,704	1.000	_	_
STEP 9	STEP 10	Std Enor	-		1.804			-
Calculate Standard Error	Calculate Median and	Median:	77.500				15.500	_
	Range	Maximum:	96.000		_			
Help Dolt	Help Dolt	Minimum	59.000			1		
	and a second second	Range:	37.000					









7 Analyzing Two Variables Using a FISH Data File

This option calculates the means, standard deviations, deviation scores, and cross products for both variables. Additionally, the unstandardized correlation coefficient (covariance), correlation coefficient, coefficient of determination (R²), regression coefficient (slope) and Y-intercept are calculated.

To use the ANALYZE TWO VARIABLES option using a FISH data file, either enter the data directly into the program using the procedure described on pages 4 through 6 of this manual or open an existing FISH data file using the procedure described on page 7 of this manual.

Once the data file is complete, it is easy to follow along as FISH computes the necessary calculations. Many of the features are the same when using the Analyze Two Variables option. Please refer to pages 10 through 12 to review these features.



FISH: Friendly Introducto	ry Statistics Help						
NUMBER OF CASES	1	Do All 10	Steps	Save Change	s Sort	by Rank	View Scatterplot
N=10 Use 100 Use 1000	Use 10000 Reset	Case #	Data (X)	Data (Y)	(X-M)	10-101	(X-M)(Y-M)
ANALYSES		1	17	14	0.285	-3.100	-0.620
STEP 1	STEP 2	2	15	20	-1.800	2.900	-5.220
Enter Data DONE	Laiculate Means			-	1.000.0000	00	19.680
Or	Help Dolt	To take ac	ivantag	e of FISH	s graphi	cs 00	3.480
		capabilitie	s, click	VIEW SCA	TTERPL	от. ₀₀	2.280
STEP 3:	STEP 4:	L	112	15	4.000	2. 00	10.080
Deviations	scores	7	23	20	6.200	2.900	17.980
Help Do It	Help Do It	8	12	12	-4.800	-5.100	24.480
		9	24	19	7.200	1.900	13.680
STEP 5 Calculate Cross	STEP 6 Calculate Sum of Cross	10	17	19	0.200	1.900	0.380
Floudets	FIDUUCIS	COLUMN	STATIS	STICS, using	variance	formulas	<u>with N-1=9:</u>
Help Do It	Help Do It	Sum:	168.000	171.000	0.000	0.000	86,200
STEP 7	STEP 8	Mean (M):	16.800	17.100	0.000	0.000	
Calculate Correlation	Calculate Shared	Variance:	18,400	10.322		100000	
		Std Dev:	4.290	3.213			
		Covariance	0				9.578
STEP 9	STEP 10	Correlation:	-				0.695
Calculate Regression	Calculate Y-Intercept	R-squared:	4				0.483
Hole	Holo De la	Coefficient:	-				0.521
	neip	Intercept:	1				8.355





ase	Observed X	Observed Y (Y)	Predicted Y (YHat)	Residual (Y-YHat)	Squared Residuals (Y-YHat)*	
1	39.000	144.000	136.579	7.421	55.076	
2	47.000	220.000	144.346	75.654	5723.580	
3	45 000	120.000	142 404	-4.404	19.394	
4	47		10110101010101010	0.654	0.428	
5	65 After clic	king VIEW PREDIC	TED VALUES,	0.179	0.032	
6	4e t	his window will ap	pear.	-1.375	1.890	
7	67			6.237	38.900	
8	42.000	121.000	100.101	-15.491	239.980	
9	67.000	158.000	163.763	-5.763	33.213	
10	56.000	154.000	153.083	0.917	0.840	
11	64.000	162.000	160.850	1 150	1 200	3
12	56.000	150.000	153.083	Click STANDA	RD ERROR OF TH	E
13	59.000	140.000	155.996	ESTIMATE for F	FISH to calculate t	he
14	34.000	110.000	131.724	value and provi	ide an explanation	1 01
15	42.000	128.000	139.491	th	e term.	
16	48.000	130.000	145.316	-15.316	234.595	
17	45.000	135.000	142.404	-7.404	54.817	
18	17.000	114.000	115.220	-1.210	1.487	
19	20.000	116.000	118.132	-2.132	4.546	
1	Predicted	Values Help	Standard Error	of Estimate		-

8 Analyzing Two Variables Using the Random Data Generator

This option calculates the means, standard deviations, deviation scores, and cross products for both variables. Additionally, the unstandardized correlation coefficient (covariance), correlation coefficient, coefficient of determination (R²), regression coefficient (slope) and Y-intercept are calculated.

To use the ANALYZE TWO VARIABLES option using the random data generator, begin by generating data as described in pages 7 through 9 of this manual.

Once the data file is complete, it is easy to follow along as FISH computes the necessary calculations. Many of the features are the same when using the data generator. Please refer to pages 10 through 12 and pages 18 through 20 to review these features.

When the user chooses to generate random data, the scatterplot feature is enhanced to allow users to draw another sample from the population. Upon drawing another sample, the new scatterplot of the data is displayed allowing the user to explore the new sample.

Analysis Options Help	N2004040 N02404540 (0254)							
UMBER OF CASES	10 - 10	the with	SAVDT 3	ove Change	a: 501	by Faring	View Scate	mp.
- 30 Uke 100 Uke 100	0 Use 10000 Reset	Cate #	Data 09	Data [1]	-	TIM	ремули	
NALYSES		1		Click on	VIEW	7	6.600	
STEP 1	STEP 2	2	SCAT	TERPLO	T to expl	ore 7	0.000	
Enter Data DONE	Latculate Means	3	the e	nhanced	scatter	plot 13	-9.457	
BL	Help Doll	4	the ra	ndom da	ta gener	ator. 3	0.000	
Longrade Hardon Lade		5		se satern		13	1.733	
STEP 3:	STEP 4:	6	12	17	-3.000	2.267	-6.800	
Deviations	calculate Deviation scores	7	22	17	7.000	2.267	15.867	
Help Doll	Help Doll	8	15	16	0.000	1.267	0.000	
		9	13	12	-2.000	-2.733	5.467	
STEP 5	STEP 6	10	19	17	4.000	2.267	9.067	
Products	Products	1	1			1.000		
Help Doll	Help	COLUMN	STATIS	FICE, using	variance	formulas	with N-1=25	ł
		Sum:	450 000	442.000	0.000	0.000	125,000	
STEP 7	STEP 8	Mean (M)	15.000	14.733	0.000	0.000		
Calculate Correlation	Variance	Variance:	13.310	8.754		1		
Help Doll	Help Doll	Std Dev:	3.648	2.959				
		Covariance	x				4 310	
STEP 9	STEP 10	Correlation					0.399	
Coefficient	Calculate T-Intercept	R-squared					IE 158	
Helo Dolt	Help Dott	Coefficient				1	0.324	
		Intercept					S 876	



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