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**HP 41 PROGRAM SUBMITTAL FORM**  
**PROGRAMMFORMBLATT/DOCUMENTATION DU PROGRAMME/GENERALITÀ SUL PROGRAMMA**

<b>Program Title</b> Programmtitel Titre du programme Titolo del programma		<u>Theil's curve fitting</u>	
<b>Category No.</b> Kategorie N° Categorie N° Categoria N°	<b>Name</b> Rubrik Rubrique Nome della categoria	<u>304</u>	<u>curvefitting/correlation/regression</u>
<b>No. of program lines</b> Anzahl Programmzeilen Nombre de lignes de programme N° di linee di programma	<u>193</u>	<b>No. of data registers</b> Anzahl des benötigten Datenspeicher Nombre de registres de données N° di registri utilizzati	<u>no. of datapairs</u>
<b>Recommended HP 41 System configuration</b> Empfohlene System-Konfiguration Configuration recommandée Configurazione raccomandata			
Port # 1	Port # 2	Port # 3	Port # 4
<b>This program requires the following programs as subroutines:</b> Dieses Programm benutzt folgende Programme als Unterprogramme: Ce programme utilise les programmes suivants comme sous-programmes: Questo programma usa i seguenti programmi come subroutines:		<b>Program Name:</b> Programm: Nom du programme: Programma:	
<b>P Applications ROM</b> HP Applications ROM ROM d'application HP ROM di applicazione HP			
<b>Program Abstract</b> Kurzbeschreibung Résumé Breve descrizione del programma			
<u>This program fits a straight line through points by sorting the x,y datapairs, the slopes and the intercepts and taking medians.</u> <u>With this method errors in high values counts as heavily as in low values, which isn't the case with the least square method.</u> <u>Erroneous data input correction is provided.</u>			
			<b>Program Size</b> <u>046</u>
<b>Name</b> Name/Nom/Nome			
<u>Ed Nieuwenhuys</u>			
<b>Address</b> Strasse/Adresse/Indirizzo			
<u>Langsom 39</u>			
<b>Country</b> Land Pays Paese	<b>Postal Code</b> Postleitzahl Code postal C.A.P.	<b>City</b> Ort Localité Città	
<u>Netherlands</u>	<u>1066 GC</u>	<u>Amsterdam</u>	
<b>ACKNOWLEDGMENT AND AGREEMENT</b> Erklärung und Ermächtigung / Déclaration et Autorisation / Dichiarazione e Autorizzazione			
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<b>Date</b> Datum Date Data	<b>Signature</b> Unterschrift Signature Firma	<u>Ed Nieuwenhuys</u>	
<u>21-10-82</u>			

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# PROGRAM DESCRIPTION I

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## PROGRAMMBESCHREIBUNG I DESCRIPTION DU PROGRAMME I DESCRIZIONE DEL PROGRAMMA I

Application, Equations, Variables    The datapairs are ranked in increasing order of  
Anwendung, Gleichungen, Veränderliche    the x values.  
Application, Equations, Variables  
Applicazione, Equazioni, Variabili

Then the slopes are calculated between the lowest  
datapair and the median +1 datapair, the slope between second lowest  
datapair and the median +2 datapair a.s.o.

After that the slopes are ranked in increasing order and the median  
is the estimate of the slope of the line of the best fit to the data.

With this slope the intercept for each datapair is calculated.  
( $b=ax-y$ ) These intercepts are ranked in increasing order and the  
median in the best fitting intercept.

### Lit. Quick statistics

Peter Sprent

Penquin education 1981

page 227-229

Operating limits and Warnings    In this program use is made of synthetic created  
Grenzen und Einschränkungen    memories, STO M, STO N, and STO O. When this program  
Limites et restrictions    is listed with the printer the printer will give  
Limiti operativi e avvertenze    other symbols.

This program has been verified only with respect to the numerical example given in Program Description II. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Dieses Programm wurde lediglich anhand des in der Programmbeschreibung II enthaltenen Zahlenbeispiels überprüft. Der Benutzer erhält und benutzt das Programmmaterial auf eigenes Risiko hin; er hat es deshalb - gleichgültig, ob es bereits anderweitig präsentiert oder beschrieben wurde - selbst zu untersuchen.

WEDER HP NOCH DER EINSENDER DES PROGRAMMS ÜBERNEHMEN FÜR DAS PROGRAMMMATERIAL EINE IRGENDWIE GEARTETE GEWÄHRLEISTUNG ODER HAFTUNG, INSBESONDERE NICHT FÜR SEINE VERKAUFLICHKEIT ODER SEINE VERWENDBARKEIT FÜR EINEN BESTIMMTEN ZWECK. HP UND DER EINSENDER HAFTEN AUCH NICHT FÜR INDIREKTE ODER FOLGESCHÄDEN.

Le présent programme n'a été vérifié qu'en ce qui concerne l'exemple numérique indiqué dans la description du programme II. L'utilisateur accepte et utilise le présent programme à SES PROPRES RISQUES et doit se fier uniquement à sa propre inspection dudit programme sans se réfier à toute autre déclaration et description.

HP ET LE FOURNISSEUR NE DONNENT AUCUNE GARANTIE, EXPRESSE OU IMPLICITE CONCERNANT LE PRÉSENT PROGRAMME, NOTAMMENT DE COMMERCIALISATION ET D'ADAPTATION À UN USAGE PARTICULIER. HP ET LE FOURNISSEUR N'ASSUMENT AUCUNE RESPONSABILITÉ EN CE QUI CONCERNE LES DOMMAGES INDIRECTS NÉS DE LA FOURNITURE, DE L'UTILISATION OU DU FONCTIONNEMENT DU PRÉSENT PROGRAMME.

Questo programma è stato verificato soltanto per quanto concerne l'esempio numerico indicato nella Descrizione del Programma II. L'utilizzatore accetta e utilizzerà il presente programma a SUO INTERO RISCHIO, fidandosi unicamente della propria verifica del programma e non basandosi su altre dichiarazioni o descrizioni.

NE LA SOCIETÀ NE L'AUTORE DANNO ALCUNA GARANZIA IMPLICITA O ESPLICITA CONCERNANTE IL PRESENTE PROGRAMMA, IN SPECIAL MODO RIGUARDANDO ALLA SUA COMMERCIALIZZAZIONE O ADATTABILITÀ AD UN USO PARTICOLARE. NE LA SOCIETÀ HP NE L'AUTORE ASSUMONO ALCUNA RESPONSABILITÀ PER DANNI IMMEDIATI O MEDIATI CAUSATI DALLA FORNITURA, UTILIZZAZIONE O FUNZIONAMENTO DEL PRESENTE PROGRAMMA.

# PROGRAM DESCRIPTION II

## PROGRAMMBESCHREIBUNG II DESCRIPTION DU PROGRAMME II DESCRIZIONE DEL PROGRAMMA II

Example

Beispiel  
Exemple  
Esempio

y	3.2	2.9	3.7	2.2	1.8	2.3	1.7	0.8	0.3
x	3	4	6	7	8	10	12	15	16

Calculation slope:  $a_{16} = \frac{2.3 - 3.2}{10 - 3} = -0.1286$       $a_{38} = -0.3222$

Point (8, 1.8) isn't used  $a_{27} = \frac{1.7 - 2.9}{12 - 4} = -0.1500$       $a_{49} = -0.2111$

The median of these values is:  $-0.2111 + -0.1500 / 2 = -0.181$       $a = -0.181$

Calculation intercept:  $b_1 = 3.2 + 0.181 \times 3 = 3.742$

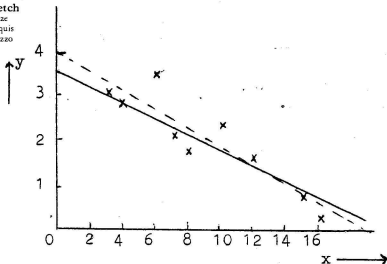
After calculation and sorting the next results are obtained: (STO 00-STO 08)  
3.189, 3.244, 3.464, 3.508, 3.622, 3.742, 3.867, 4.106, 4.783.

The median and the median +1 are the underlined values, the mean is 3.682

$b = 3.682$

To minimize the error the mean of the median and the median +1 is calculated.

Sketch  
jez  
croquis  
Schizzo



Theil line (continuous) and least square line (broken).



**PROGRAM LISTING**  
**PROGRAMMAUFLISTUNG**  
**LISTAGE DU PROGRAMME**  
**LISTATO DI PROGRAMMA**

Line Zeile Ligne Linea	Keystrokes Tastensequenz Touches Tasti	Comments Kommentar Commentaires Commenti	Line Zeile Ligne Linea	Key pressed Tastensequenz Touches Tasti	Comments Kommentar Commentaires Commenti
01	Δ LBL THE		51	1	
	CLRG			+	
	↑Y ↑X			RCL IND X	
	AVIEW			FRC	
05	PSE		55	X<>Y	
	CLA			RDN	
	Δ LBL 09			-	
	• CF 22			E5	
	STOP			X	
10	• FC? 22		60	RCL IND 0	
	GO TO 10 →			INT	
	STOP			RCL N	
	X<>Y			RCL 0	
	E5			+	
15	/		65	1	
	+			+	
	STO IND M			RCL IND X	
	ISG M			X<>Y	
	X<>X			RDN	
20	RCL M		70	INT	
	GO TO 09 →			-	
	Δ LBL 10			/	
	DSE M			STO IND M	
	RCL M			ISG 0	
25	E3		75	X<>X	
	/			GO TO 15 →	
	XEQ 11 ↔			Δ LBL 26	
	FRC			RCL M	
	E3			RCL 0	
30	x		80	STO N	
	STO M			-	
	2			XEQ 11 ↔	
	/			STO Y	
	INT			INT	
35	STO N		85	RCL 0	
	RCL M			2	
	+			/	
	E3			-	
	/			INT	
40	ST+M		90	STO Y	
	Δ LBL 15			1	
	ISG M			-	
	GO TO 22 →			RCL IND X	
	GO TO 26 →			RCL IND Z	
45	Δ LBL 22		95	+	
	RCL IND 0			2	
	FRC			/	
	RCL N			STO 0	
	RCL 0			RCL M	
50	+		100	RCL N	

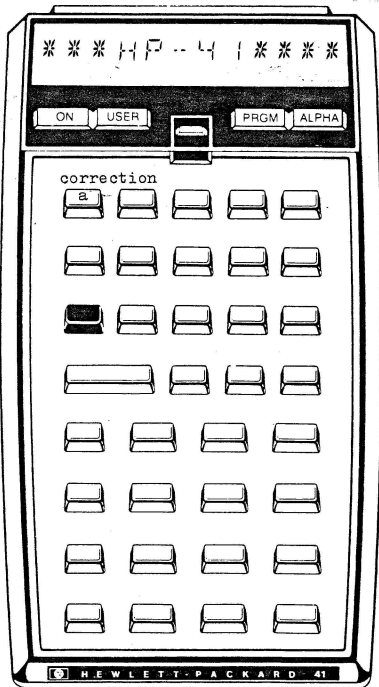
# PROGRAM LISTING

## PROGRAMMAUFLISTUNG LISTAGE DU PROGRAMME LISTATO DI PROGRAMMA

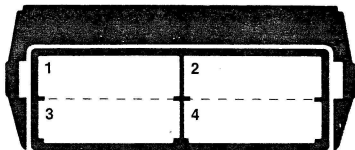
Line Zeile Ligne Linea	Keystrokes Tastenseq Touches Tasti	Comments Kommentar Commentaires Commenti	Line Zeile Ligne Linea	Key pressed Tastenseq Touches Tasti	Comments Kommentar Commentaires Commenti
1 01	-		51	STO M	
	1			STO Y	
	-			Δ LBL 01	
	INT			VIEW X	
05	E3		55	RCL IND X	
	/			Δ LBL 02	
	STO M			ISG Y	
	Δ LBL 40			GO TO 06 →	
	RCL IND M			GO TO 03 →	
10	STO Y		60	Δ LBL 06	
	INT			RCL IND Y	
	RCL 0			X<Y?	
	X			GO TO 04 →	
	CHS			RDN	
15	X<>Y		65	GO TO 02 →	
	FRC			Δ LBL 04	
	E5			X<>Y	
	X			STO IND Z	
	+			RDN	
20	STO IND M		70	GO TO 02 →	
	ISG M			Δ LBL 03	
	GO TO 40 →			STO IND M	
	RCL M			ISG M	
	INT			GO TO 05 →	
25	1		75	GO TO 30 →	
	-			Δ LBL 05	
	E3			CLST	
	/			RCL M	
	XEQ 11 ⇐			RCL M	
30	INT		80	GO TO 01 →	
	2			Δ LBL 08	
	/			RCL IND M	
	INT			STO IND T	
	STO Y			RDN	
35	1		85	GO TO 02 →	
	+			Δ LBL 30	
	RCL IND X			RCL M	
	RCL IND Z			← RTN	
	+			Δ LBL a	
40	2		90	DSE M	
	/			RCL M	
	RCL 0			GO TO 09 →	
	FIX 3		93	END	
	a=				
45	ARCL X		95		
	PROMPT				
	b=				
	ARCL Y				
	PROMPT				
50	Δ LBL 11		00		



SYSTEM CONFIGURATION  
 CONFIGURAZIONE DEL SISTEMA



Assignments  
 Belegungen  
 Assignations  
 Assegnamenti



Configuration  
 Belegung  
 Configuration  
 Configurazione



Magnetic card  
 Magnetkarte  
 Carte magnétique  
 Scheda magnetica