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Page 1 of 8

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

Program Title	Theil's curve fitting		
Programmtitel			
Titre du programme			
Titolo del programma			
Category No.	Name		
Kategorie Nr.	Rubrik	curvefitting/correlation/regression	
Categorie N°	Rubrique		
Categoria N°	Nome della categoria		
No. of program lines	193	No. of data registers	no. of datapairs
Anzahl Programmzeilen		Anzahl des benötigten Datenspeicher	
Nombre de lignes de programme		Nombre de registres de données	
Nº di linee di programma		Nº di registri utilizzati	
<b>Recommended HP 41 System configuration</b>			
Empfohlene System-Konfiguration	Port # 1	Port # 2	
Configuration recommandée			
Configurazione raccomandata	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 subroutine:			
<b>P Applications ROM</b>			
HP Applications ROM			
ROM d'application HP			
ROM di applicazione HP			
Program Abstract	This program fits a straight line through points by sorting the x,y datapairs, the slopes and the intercepts and taking medians.		
Kurzbeschreibung			
Résumé			
Breve descrizione del programma			
With this method errors in high values counts as heavily as in low values, which isn't the case with the least square method.			
Erroneous data input correction is provided.			
Program Size <u>046</u>			
Name	Ed Nieuwenhuys		
Name/Nom/Nome			
Address	Langsom 39		
Strasse/Adresse/Indirizzo			
Country	Netherlands	Postal Code	1066 GC
Land		Postleitzahl	
Pays		Code postal	
Paese		C.A.P.	
<b>ACKNOWLEDGMENT AND AGREEMENT</b>			
Erklärung und Ermächtigung/Déclaration et Autorisation/Dichiarazione e Autorizzazione			
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Date	Signature		
Datum	Unterschrift		
Date	Signature		
Data	Firma		
<span style="font-size: 2em; margin-right: 10px;">21-10-82</span> <span style="font-size: 2em; margin-right: 10px;">D.N.E. 11</span>			

**HEWLETT-PACKARD SA**

Users' Program Library Europe

7, rue du Bois-du-Lan  
P.O. Box, CH-1217 Meyrin 2  
Geneva - Switzerland

# PROGRAM DESCRIPTION I

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PROGRAMMBESCHREIBUNG I  
DESCRIPTION DU PROGRAMME I  
DESCRIZIONE DEL PROGRAMMA I

Application, Equations, Variables  
Anwendung, Gleichungen, Variablen  
Applikation, Equations, Variables  
Applicazione, Equazioni, Variabili

The datapairs are ranked in increasing order of  
the x values.

Than 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

Penguin education 1981

page 227-229

Operating limits and Warnings  
Grenzen und Einschränkungen  
Limites et restrictions  
Limiti operativi e avvertenze

In this program use is made of synthetic created  
memories. STO M, STO N, and STO O. When this program  
is listed with the printer the printer will give  
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 PROGRAMMATERIAL EINE IRGENDWIE GEÄRGTE GEWAHRLEISTUNG ODER HAFTUNG, INSbesondere NICHT FÜR SEINE VERKÄUFLICHKEIT 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 du/des programme(s) sans se référer à toute autre déclaration ou 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 NIÉS 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 NÉ L'AUTORE DANNO ALCUNA GARANZIA IMPLICITA O ESPlicita CONCERNENTE IL PRESENTE PROGRAMMA, IN SPECIAL modo RIGUARDO ALLA SUA COMMERCIALIZZAZIONE O ADATTABILITÀ AD UN USO PARTICOLARE. NI LA SOCIETÀ HI NI L'AUTORE ASSUMONO ALCUNA RESPONSABILITÀ PER DANNI IMMEDIATI O MEDIANI CAUSATI DALLA FORNITURA, UTILIZZAZIONE O FUNZIONAMENTO DEL PRESENTE PROGRAMMA.

## PROGRAM DESCRIPTION II

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

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

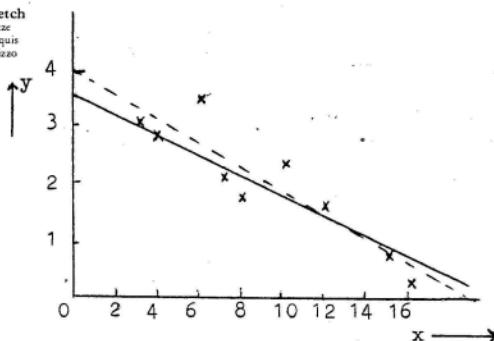
The median of these values is:  $-0.2111 + -0.1500 / 2 = -0.181 \quad a = -0.181$

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

After calculation and sorting the next results are obtained: (STO 00-STO 03)  
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  
Zeichnung  
Croquis  
Schizzo

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

**(Example continued)**  
(Beispiel Fortsetzung)  
(Exemple, suite)  
(Esempio)

### **PROGRAM DESCRIPTION III**

### **PROGRAMMBESCHREIBUNG III**

### **DESCRIPTION DU PROGRAMME III**

### **DESCRIZIONE DEL PROGRAMMA III**

# PROGRAM LISTING

PROGRAMMAUFLISTUNG

LISTAGE DU PROGRAMME

LISTATO DI PROGRAMMA

Page 5 of 10

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

Please use paper glue to attach listings. Adhesive tape may affect print!  
Bitte Listings mit Papierleim einkleben. Klebefilme können Druck beeinflussen!

S.V.P. utilisez de la colle à papier pour fixer les listings. Les rubans adhésifs peuvent altérer l'impression!  
Per favore usare la colla per fissare i listati. Il nastro adesivo può alterare lo stampato!

# PROGRAM LISTING

PROGRAMMAFLISTUNG

LISTAGE DU PROGRAMME

LISTATO DI PROGRAMMA

Page 6 of 8

Line Zeile Ligne Lines	Keystrokes Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commentari	Line Zeile Ligne Lines	Key pressed Tastenfolge Touches Tasti	Comments Kommentar Commentaires Commentari
1 01	-		51	STO M	
	1			STO Y	
	-			▲LBL 01	
	INT			VIEW X	
05	E3		55	RCL IND X	
	/			▲LBL 02	
	STO M			ISG Y	
	▲LBL 40			GO TO 06 →	
	RCL IND M			GO TO 03 →	
10	STO Y		60	▲LBL 06	
	INT			RCL IND Y	
	RCL O			X<Y?	
	X			GO TO 04 →	
	CHS			RDN	
15	X<>Y		65	GO TO 02 →	
	FRC			▲LBL 04	
	E5			X<>Y	
	X			STO IND Z	
	+			RDN	
20	STO IND M		70	GO TO 02 →	
	ISG M			▲LBL 03	
	GO TO 40 →			STO IND M	
	RCL M			ISG M	
	INT			GO TO 05 →	
25	1		75	GO TO 30 →	
	-			▲LBL 05	
	E3			CLST	
	/			RCL M	
	XEQ 11 ↵			RCL M	
30	INT		80	GO TO 01 →	
	2			▲LBL 08	
	/			RCL IND M	
	INT			STO IND T	
	STO Y			RDN	
35	1		85	GO TO 02 →	
	+			▲LBL 30	
	RCL IND X			RCL M	
	RCL IND Z			←RTN	
	+			▲LBL a	
40	2		90	DSE M	
	/			RCL M	
	RCL O			GO TO 09 →	
	FIX 3		193	END	
	a=				
45	ARCL X		95		
	PROMPT				
	b=				
	ARCL Y				
	PROMPT				
50	▲LBL 11		60		

Please use paper glue to attach listings. Adhesive tape may affect print!  
Bitte Listings mit Papierleim einkleben. Klebefilme können Druck beeinflussen!

S.V.P. utilisez de la colle à papier pour fixer les listings. Les rubans adhésifs peuvent altérer l'impression!  
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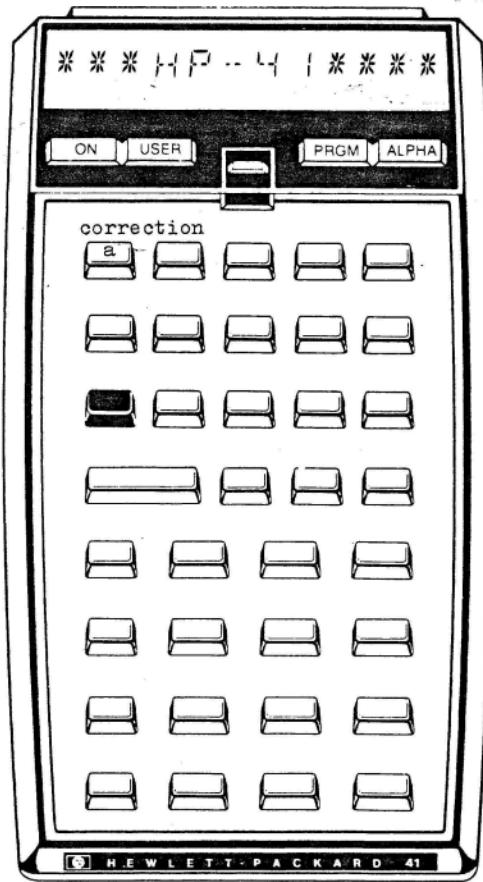
**REGISTERS, STATUS, FLAGS**  
 REGISTERBELEGUNG, FLAGS, BETRIEBSARTEN  
 REGISTRES, INDICATEURS, MODES OPÉRATOIRES  
 REGISTR, MODI OPERATIVI, FLAGS

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Registers Datenspeicher/Registres de données/Registri				Status Betriebsart/Modes opératoires/Modi operativi			
00		50		Size	NO	Xi Vi	Total Reg. 046
				Eng	<input type="checkbox"/>	Fix <input checked="" type="checkbox"/>	Sci <input type="checkbox"/>
				Deg	<input type="checkbox"/>	Rad <input type="checkbox"/>	Grad <input type="checkbox"/>
				Purpose	Flags		
				Bedeutung			
				Signification			
				Scopo			
05		55				SUM	CLEAR
				00			
				01			
				02			
10		60		03			
				04			
				05			
				06			
15		65		07			
				08			
				09			
				10			
				11	Audio execute		
				12			
20		70		13			
				14			
				15			
				16			
25		75		17			
				18			
				19			
				20			
				21	Printer Enable		
30		80		22	Number Input	used	
				23	Alpha Input		
				24	Range Ignore		
				25	Error Ignore		
				26	Audio Enable		
				27	User Mode		
35		85		28	Decimal Point		
				29	Digit Grouping		
Assignments Tastenbelegung/Assignations/Assegnamenti							
40		90		Function	Key	Function	Key
				Funktion	Taste	Funktion	Taste
				Fonction	Touche	Fonction	Touche
				Funzione	Tasto	Funzione	Tasto
45		95		last data input			
				correction	a		
		99					

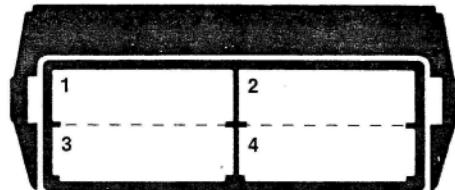
SYSTEM CONFIGURATION  
CONFIGURAZIONE DEL SISTEMA

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Assignments  
Belegungen  
Assignations  
Assegnamenti

Configuration  
Belegung  
Configuration  
Configurazione



Magnetic card  
Magnetikkarte  
Carte magnétique  
Scheda magnetica