Gram-Schmidt Procedure (3D) - Data Set 1

Walter Manger

	x	y	z
u1	1	2	5
u2	0	4	11
u3	0	2	4

V1 = u1	1	2	5
V2 = u2 - A	-2.1	-0.2	0.5
V2 = u3 - B - C	-0.085106383	0.468085	-0.170213

||V1|| =	5.477225575			Norms	
e1 = V1/||V1|| =	0.182574186	0.365148	0.912871	1	Orthonormal
||V2|| =	2.167948339				
e2 = V2/||V2|| =	-0.968657768	-0.092253	0.230633	1	Orthonormal
||V3|| =	0.505291153				
e3 = V3/||V3|| =	-0.168430384	0.926367	-0.336861	1	Orthonormal

V1 on V2	0	This is not an Orthogonal set
V2 on V3	1.94289E-16	
V1 on V3	0	

u2·V1 =	63		
V1·V1 =	30		
u2·V1/V1·V1 =	2.1		
A = (u2·V1/V1·V1)*V1 =	2.1	4.2	10.5
u3·V1 =	24		
u3·V1/V1·V1 =	0.8		
B = (u3·V1/V1·V1)*V1 =	0.8	1.6	4
u3·V2 =	1.6		
u3·V2/V2·V2 =	0.340426		
C = (u3·V2/V2·V2)*V2 =	-0.714894	-0.068085	0.170213

Gram-Schmidt Procedure (3D) - Data Set 2

Walter Manger

	x	y	z
u1	5	0	0
u2	5	1	0
u3	5	5	4

V1 = u1	5	0	0
V2 = u2 - A	0	1	0
V2 = u3 - B - C	0	0	4

u2·V1 = 25
V1·V1 = 25
u2·V1/V1·V1 = 1

A = (u2·V1/V1·V1)*V1 =	5	0	0

u3·V1 = 25
u3·V1/V1·V1 = 1

B = (u3·V1/V1·V1)*V1 =	5	0	0

u3·V2 = 5
u3·V2/V2·V2 = 5

C = (u3·V2/V2·V2)*V2 =	0	5	0

||V1|| =	5			Norms	
e1 = V1/||V1|| =	1	0	0	1	Orthonormal
||V2|| =	1				
e2 = V2/||V2|| =	0	1	0	1	Orthonormal
||V3|| =	4				
e3 = V3/||V3|| =	0	0	1	1	Orthonormal

V1 on V2	0	This is an Orthogonal set
V2 on V3	0	
V1 on V3	0	

Gram-Schmidt Procedure (3D) - Data Set 3

Walter Manger

	x	y	z
u1	1	2	5
u2	2	4	10
u3	0	2	4

V1 = u1	1	2	5
V2 = u2 - A	0	0	0
V2 = u3 - B - C	-0.8	0.4	0

u2·V1 = 60
V1·V1 = 30
u2·V1/V1·V1 = 2

A = (u2·V1/V1·V1)*V1 =	2	4	10

u3·V1 = 24
u3·V1/V1·V1 = 0.8

B = (u3·V1/V1·V1)*V1 =	0.8	1.6	4

u3·V2 = 0
u3·V2/V2·V2 =

C = (u3·V2/V2·V2)*V2 =	0	0	0

||V1|| =	5.477225575			Norms	
e1 = V1/||V1|| =	0.182574186	0.365148	0.9128709	1	Orthonormal
||V2|| =	0				
e2 = V2/||V2|| =				#VALUE!	#VALUE!
||V3|| =	0.894427191				
e3 = V3/||V3|| =	-0.894427191	0.447214	0	1	Orthonormal

V1 on V2	#VALUE!	#VALUE!
V2 on V3	#VALUE!	
V1 on V3	-5.55112E-17	

Gram-Schmidt Procedure (3D) - Data Set 4

Walter Manger

	x	y	z
u1	1	0	2
u2	2	4	0
u3	3	2	9

V1 = u1	1	0	2
V2 = u2 - A	1.6	4	-0.8
V2 = u3 - B - C	-1.66667	0.833333	0.833333

u2·V1 = 2
V1·V1 = 5
u2·V1/V1·V1 = 0.4

A = (u2·V1/V1·V1)*V1 =	0.4	0	0.8

u3·V1 = 21
u3·V1/V1·V1 = 4.2

B = (u3·V1/V1·V1)*V1 =	4.2	0	8.4

u3·V2 = 5.6
u3·V2/V2·V2 = 0.291667

C = (u3·V2/V2·V2)*V2 =	0.466667	1.166667	-0.23333

				Norms	
||V1|| =	2.236068				
e1 = V1/||V1|| =	0.447214	0	0.894427	1	Orthonormal
||V2|| =	4.38178				
e2 = V2/||V2|| =	0.365148	0.912871	-0.18257	1	Orthonormal
||V3|| =	2.041241				
e3 = V3/||V3|| =	-0.8165	0.408248	0.408248	1	Orthonormal

V1 on V2	0	This is an Orthogonal set
V2 on V3	0	
V1 on V3	0	

Gram-Schmidt Procedure (4D) - Data Set 1

Walter Manger

	x	y	z	t
u1	2	0	0	0
u2	4	8	0	0
u3	3	6	9	0
u4	0	0	0	8
V1 = u1	2	0	0	0
V2 = u2 - A	0	8	0	0
V3 = u3 - B - C	0	0	9	0
V4 = u4 -D - E - F	0	0	0	8

V1·V1 =	4
V2·V2 =	64
V3·V3 =	81
V4·V4 =	64

u2·V1 =	8			
u2·V1/V1·V1 =	2			
A = (u2·V1/V1·V1)*V1 =	4	0	0	0
u3·V1 =	6			
u3·V1/V1·V1 =	1.5			
B = (u3·V1/V1·V1)*V1 =	3	0	0	0
u3·V2 =	48			
u3·V2/V2·V2 =	0.75			
C = (u3·V2/V2·V2)*V2 =	0	6	0	0
u4·V1 =	0			
u4·V1/V1·V1 =	0			
D = (u4·V1/V1·V1)*V1 =	0	0	0	0
u4·V2 =	0			
u4·V2/V2·V2 =	0			
E = (u4·V2/V2·V2)*V2 =	0	0	0	0
u4·V3 =	0			
u4·V3/V3·V3 =	0			
F = (u4·V3/V3·V3)*V3 =	0	0	0	0

					Norms	
||V1|| =	2					
e1 = V1/||V1|| =	1	0	0	0	1	Orthonormal
||V2|| =	8					
e2 = V2/||V2|| =	0	1	0	0	1	Orthonormal
||V3|| =	9					
e3 = V3/||V3|| =	0	0	1	0	1	Orthonormal
||V4|| =	8					
e3 = V3/||V3|| =	0	0	0	1	1	Orthonormal

V1 on V2	0	This is an Orthogonal set
V1 on V3	0	
V1 on V4	0	
V2 on V3	0	
V2 on V4	0	
V3 on V4	0	

Gram-Schmidt Procedure (4D) - Data Set 2

Walter Manger

	x	y	z	t
u1	4	0	0	0
u2	4	8	0	0
u3	4	8	9	0
u4	4	8	9	8

V1 = u1	4	0	0	0
V2 = u2 - A	0	8	0	0
V3 = u3 - B - C	0	0	9	0
V4 = u4 -D - E - F	0	-8	-9	0

V1·V1 =	16
V2·V2 =	64
V3·V3 =	81
V4·V4 =	145

u2·V1 =	16			
u2·V1/V1·V1 =	1			
A = (u2·V1/V1·V1)*V1 =	4	0	0	0
u3·V1 =	16			
u3·V1/V1·V1 =	1			
B = (u3·V1/V1·V1)*V1 =	4	0	0	0
u3·V2 =	64			
u3·V2/V2·V2 =	1			
C = (u3·V2/V2·V2)*V2 =	0	8	0	0
u4·V1 =	16			
u4·V1/V1·V1 =	1			
D = (u4·V1/V1·V1)*V1 =	4	8	9	8
u4·V2 =	64			
u4·V2/V2·V2 =	1			
E = (u4·V2/V2·V2)*V2 =	0	8	0	0
u4·V3 =	81			
u4·V3/V3·V3 =	1			
F = (u4·V3/V3·V3)*V3 =	0	0	9	0

					Norms	
‖V1‖ =	4					
e1 = V1/‖V1‖ =	1	0	0	0	1	Orthonormal
‖V2‖ =	8					
e2 = V2/‖V2‖ =	0	1	0	0	1	Orthonormal
‖V3‖ =	9					
e3 = V3/‖V3‖ =	0	0	1	0	1	Orthonormal
‖V4‖ =	12.04159					
e3 = V3/‖V3‖ =	0	-0.66436	-0.74741	0	1	Orthonormal

V1 on V2	0	This is not an Orthogonal set
V1 on V3	0	
V1 on V4	0	
V2 on V3	0	
V2 on V4	-0.66436	
V3 on V4	-0.74741	

Gram-Schmidt Procedure (4D) - Data Set 3

Walter Manger

	x	y	z	t
u1	4	0	0	0
u2	6	8	8	8
u3	4	0	9	5
u4	8	8	9	8

V1 = u1	4	0	0	8
V2 = u2 - A	1.6	8	8	-0.8
V3 = u3 - B - C	0.292683	-4.53659	4.463415	-0.14634
V4 = u4 -D - E - F	-3.37297	-9.71892	-11.0378	-0.71351

V1·V1 =	80
V2·V2 =	131.2
V3·V3 =	40.60976
V4·V4 =	228.1773

u2·V1 =	88			
u2·V1/V1·V1 =	1.1			
A = (u2·V1/V1·V1)*V1 =	4.4	0	0	8.8
u3·V1 =	56			
u3·V1/V1·V1 =	0.7			
B = (u3·V1/V1·V1)*V1 =	2.8	0	0	5.6
u3·V2 =	74.4			
u3·V2/V2·V2 =	0.567073			
C = (u3·V2/V2·V2)*V2 =	0.907317	4.536585	4.536585	-0.45366
u4·V1 =	96			
u4·V1/V1·V1 =	1.2			
D = (u4·V1/V1·V1)*V1 =	9.6	9.6	10.8	9.6
u4·V2 =	142.4			
u4·V2/V2·V2 =	1.085366			
E = (u4·V2/V2·V2)*V2 =	1.736585	8.682927	8.682927	-0.86829
u4·V3 =	5.04878			
u4·V3/V3·V3 =	0.124324			
F = (u4·V3/V3·V3)*V3 =	0.036388	-0.56401	0.554911	-0.01819

||V1|| =	8.944272				Norms	
e1 = V1/||V1|| =	0.447214	0	0	0.894427	1	Orthonormal
||V2|| =	11.45426					
e2 = V2/||V2|| =	0.139686	0.69843	0.69843	-0.06984	1	Orthonormal
||V3|| =	6.372578					
e3 = V3/||V3|| =	0.045928	-0.71189	0.70041	-0.02296	1	Orthonormal
||V4|| =	15.10554					
e3 = V3/||V3|| =	-0.22329	-0.6434	-0.73071	-0.04724	1	Orthonormal

V1 on V2	-6.2E-17	This is not an Orthogonal set
V1 on V3	1.28E-16	
V1 on V4	-0.14211	
V2 on V3	9.15E-17	
V2 on V4	-0.98762	
V3 on V4	-0.06294	

Gram-Schmidt Procedure (4D) - Data Set 4

Walter Manger

	x	y	z	t
u1	1	0	0	9
u2	0	8	4	2
u3	4	0	9	5
u4	0	8	0	1

V1 = u1	1	0	0	4
V2 = u2 - A	-0.47059	8	4	0.117647
V3 = u3 - B - C	2.791789	-3.46041	7.269795	-0.69795
V4 = u4 -D - E - F	1.459892	-1.61872	-0.37418	0.399733

V1·V1 =	17
V2·V2 =	80.23529
V3·V3 =	73.10557
V4·V4 =	5.051352

u2·V1 =	8			
u2·V1/V1·V1 =	0.470588			
A = (u2·V1/V1·V1)*V1 =	0.470588	0	0	1.882353
u3·V1 =	24			
u3·V1/V1·V1 =	1.411765			
B = (u3·V1/V1·V1)*V1 =	1.411765	0	0	5.647059
u3·V2 =	34.70588			
u3·V2/V2·V2 =	0.432551			
C = (u3·V2/V2·V2)*V2 =	-0.20355	3.460411	1.730205	0.050888
u4·V1 =	4			
u4·V1/V1·V1 =	0.235294			
D = (u4·V1/V1·V1)*V1 =	0	1.882353	0	0.235294
u4·V2 =	64.11765			
u4·V2/V2·V2 =	0.79912			
E = (u4·V2/V2·V2)*V2 =	-0.37606	6.392962	3.196481	0.094014
u4·V3 =	-28.3812			
u4·V3/V3·V3 =	-0.38822			
F = (u4·V3/V3·V3)*V3 =	-1.08384	1.343409	-2.8223	0.270959

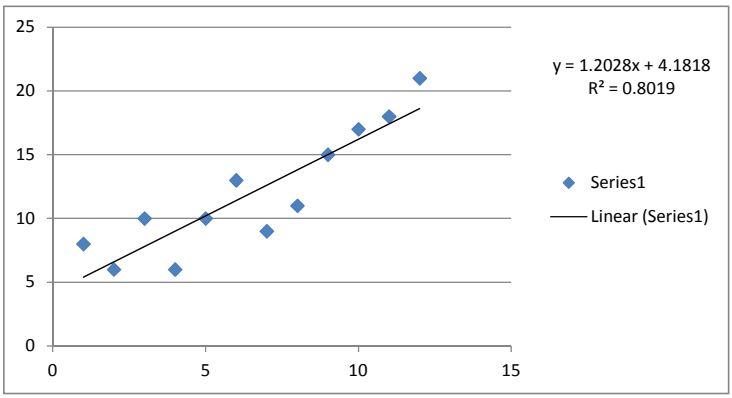
||V1|| =	4.123106				Norms	
e1 = V1/||V1|| =	0.242536	0	0	0.970143	1	Orthonormal
||V2|| =	8.957416					
e2 = V2/||V2|| =	-0.05254	0.893115	0.446557	0.013134	1	Orthonormal
||V3|| =	8.55018					
e3 = V3/||V3|| =	0.326518	-0.40472	0.850251	-0.08163	1	Orthonormal
||V4|| =	2.247521					
e3 = V3/||V3|| =	0.649556	-0.72023	-0.16649	0.177855	1	Orthonormal

V1 on V2	0	This is not an Orthogonal set
V1 on V3	0	
V1 on V4	0.330085	
V2 on V3	9.54E-18	
V2 on V4	-0.74938	
V3 on V4	0.347507	

Least Square Forcasting - Data Set 1

Walter Manger

x	y	xy	x^2	y^2	y^
1	8	8	1	64	5.38
2	6	12	4	36	6.59
3	10	30	9	100	7.79
4	6	24	16	36	8.99
5	10	50	25	100	10.2
6	13	78	36	169	11.4
7	9	63	49	81	12.6
8	11	88	64	121	13.8
9	15	135	81	225	15.01
10	17	170	100	289	16.21
11	18	198	121	324	17.41
12	21	252	144	441	18.62
15	Forcasted at x ---------->				22.22
20	Forcasted at x ---------->				28.24
25	Forcasted at x ---------->				34.25



Points	∑x	∑y	∑xy	$\sum x^2$	$\sum y^2$
12	78	144	1108	650	1986

$$\overline{X} = \frac{78}{12} = 6.5 \qquad \overline{Y} = \frac{144}{12} = 12$$

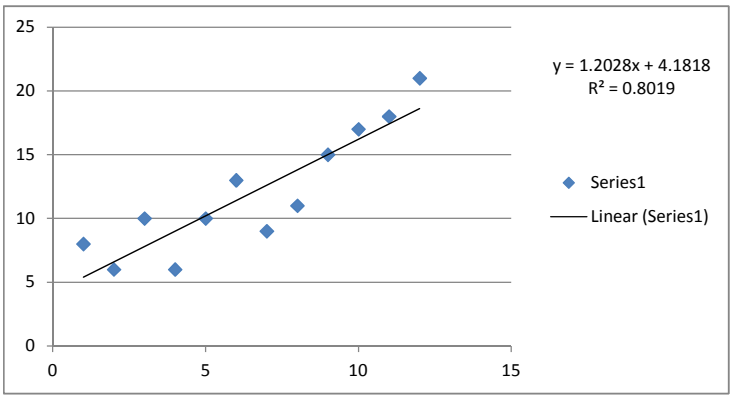
b = | 12 | 1108 | - | 78 | 144 | = 1.202797
| 12 | 650 | - | 78 | 78 |

a = ybar - xbar*b = 4.181818

Least Square Forcasting - Data Set 2

Walter Manger

x	y	xy	x^2	y^2	y^
1	254	254	1	64516	250.22
2	257	514	4	66049	255.01
3	249	747	9	62001	259.81
4	253	1012	16	64009	264.6
5	275	1375	25	75625	269.39
6	273	1638	36	74529	274.19
7	287	2009	49	82369	278.98
8	295	2360	64	87025	283.77
9	289	2601	81	83521	288.57
10	297	2970	100	88209	293.36
11	301	3311	121	90601	298.16
12	289	3468	144	83521	302.95
15	Forcasted at x ---------->				317.33
20	Forcasted at x ---------->				341.3
25	Forcasted at x ---------->				365.27



Points	∑x	∑y	∑xy	$\sum x^2$	$\sum y^2$
12	78	3319	22259	650	921975

$\overline{X} = \frac{78}{12} =$ 6.5 $\quad \overline{Y} = \frac{3319}{12} =$ 276.5833

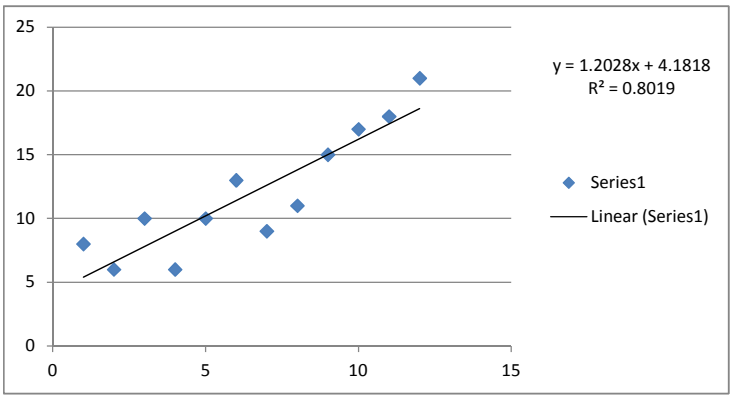
b = | 12 | 22259 | - | 78 | 3319 | = 4.793706
| 12 | 650 | - | 78 | 78 |

a = ybar - xbar*b = 245.4242

Least Square Forcasting - Data Set 3

Walter Manger

x	y	xy	x^2	y^2	y^
1	3.25	3.25	1	10.5625	3.62
2	3.46	6.92	4	11.9716	3.59
3	3.57	10.71	9	12.7449	3.57
4	3.63	14.52	16	13.1769	3.55
5	3.84	19.2	25	14.7456	3.52
6	3.91	23.46	36	15.2881	3.5
7	3.68	25.76	49	13.5424	3.47
8	3.36	26.88	64	11.2896	3.45
9	3.28	29.52	81	10.7584	3.43
10	3.33	33.3	100	11.0889	3.4
11	3.26	35.86	121	10.6276	3.38
12	3.27	39.24	144	10.6929	3.36
15	Forcasted at x ---------->				3.29
20	Forcasted at x ---------->				3.17
25	Forcasted at x ---------->				3.05



Points	∑x	∑y	∑xy	$\sum x^2$	$\sum y^2$
12	78	41.84	268.62	650	146.4894

$\overline{X} = \frac{78}{12} =$ 6.5 $\quad \overline{Y} = \frac{41.84}{12} =$ 3.486667

b =	12	268.62	-	78	41.84	=	-0.02336
	12	650	-	78	78		

a = ybar - xbar*b = 3.638485