

## LAMPIRAN

QM for Windows - D:\Vony\Program PT SAC.for - [Details and Error Analysis]

FILE EDIT VIEW TAYLOR MODULE FORMAT TOOLS SOLUTIONS HELP EDIT DATA

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INSTRUCTION: There are more results available in additional windows. These may be opened by using the SOLUTIONS menu in the Main Menu.

Module tree Hide Panel

- Assignment
- Break-even/Cost-Volume Analysis
- Decision Analysis
- Forecasting
- Game Theory
- Goal Programming
- Integer & Mixed Integer Programming
- Inventory
- Linear Programming
- Markov Analysis
- Material Requirements Planning
- Networks
- Project Management (PERT/CPM)
- Quality Control
- Scoring Model
- Simulation
- Statistics (mean, var, sd; normal dist)
- Transportation
- Waiting Lines
- Display QM Modules only
- Display QM Modules only
- Display ALL Modules

Method: Moving Averages # Periods to average: 2

(untitled) Solution

|                      | Penjualan | Forecast | Error    | Error    | Error*2   | Pct Error |
|----------------------|-----------|----------|----------|----------|-----------|-----------|
| January              | 2807.44   |          |          |          |           |           |
| February             | 1058.67   |          |          |          |           |           |
| March                | 2516.44   | 1933.055 | 583.385  | 583.385  | 340338.1  | 23.183%   |
| April                | 1780.43   | 1787.555 | -7.125   | 7.125    | 50.764    | .4%       |
| May                  | 2517.63   | 2148.435 | 369.195  | 369.195  | 136304.8  | 14.664%   |
| June                 | 2581.35   | 2149.03  | 432.32   | 432.32   | 186900.6  | 16.748%   |
| July                 | 3314.15   | 2549.49  | 764.66   | 764.66   | 584704.8  | 23.073%   |
| August               | 2934.56   | 2947.75  | -13.19   | 13.19    | 173.975   | .449%     |
| September            | 4503.34   | 3124.355 | 1378.985 | 1378.985 | 1901599.0 | 30.621%   |
| October              | 3618.3    | 3718.95  | -100.65  | 100.65   | 10130.4   | 2.782%    |
| November             | 5564.48   | 4060.82  | 1503.66  | 1503.66  | 2260994.0 | 27.022%   |
| December             | 2324.7    | 4591.39  | -2266.69 | 2266.69  | 5137885.0 | 97.505%   |
| TOTALS               | 35521.49  |          | 2644.55  | 7419.859 | 10559080  | 236.448%  |
| AVERAGE              | 2960.124  |          | 264.455  | 741.986  | 1055908.0 | 23.645%   |
| Next period forecast |           | 3944.59  | (Bias)   | (MAD)    | (MSE)     | (MAPE)    |
|                      |           |          |          |          | 1148.863  |           |

Forecasting/Time Series Analysis | Solution Screen | Taylor's Introduction to Management Science Textbook | Developed by Howard J. Weiss

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INSTRUCTION: There are more results available in additional windows. These may be opened by using the SOLUTIONS menu in the Main Menu.

Module tree Hide Panel

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- Display QM Modules only
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Method: Moving Averages # Periods to average: 3

(untitled) Solution

|               | Penjualan | Forecast | Error    | Error    | Error*2   | Pct Error |
|---------------|-----------|----------|----------|----------|-----------|-----------|
| January       | 2807.44   |          |          |          |           |           |
| February      | 1058.67   |          |          |          |           |           |
| March         | 2516.44   |          |          |          |           |           |
| April         | 1780.43   | 2127.517 | -347.087 | 347.087  | 120469.1  | 19.495%   |
| May           | 2517.63   | 1785.18  | 732.45   | 732.45   | 536482.8  | 29.093%   |
| June          | 2581.35   | 2271.5   | 309.85   | 309.85   | 96007.09  | 12.003%   |
| July          | 3314.15   | 2293.137 | 1021.013 | 1021.013 | 1042468.0 | 30.808%   |
| August        | 2934.56   | 2804.377 | 130.183  | 130.183  | 16947.71  | 4.436%    |
| September     | 4503.34   | 2943.353 | 1559.987 | 1559.987 | 2433558   | 34.641%   |
| October       | 3618.3    | 3584.017 | 34.283   | 34.283   | 1175.355  | .948%     |
| November      | 5564.48   | 3685.4   | 1879.08  | 1879.08  | 3530941   | 33.769%   |
| December      | 2324.7    | 4562.04  | -2237.34 | 2237.34  | 5005691.0 | 96.242%   |
| TOTALS        | 35521.49  |          | 3082.42  | 8251.272 | 12783740  | 261.434%  |
| AVERAGE       | 2960.124  |          | 342.491  | 916.808  | 1420416.0 | 29.048%   |
| Next perio... |           | 3835.827 | (Bias)   | (MAD)    | (MSE)     | (MAPE)    |
|               |           |          |          | Std err  | 1351.388  |           |

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- Transportation
- Waiting Lines
- Display OM Modules only
- Display QM Modules only
- Display ALL Modules

Method: Weighted Moving Average # Periods to average: 2

(untitled) Solution

|               | Penjualan | Forecast | Error     | Error    | Error^2   | Pct Error |
|---------------|-----------|----------|-----------|----------|-----------|-----------|
| January       | 2807.44   |          |           |          |           |           |
| February      | 1058.67   |          |           |          |           |           |
| March         | 2516.44   | 1758.178 | 758.262   | 758.262  | 574961.2  | 30.132%   |
| April         | 1780.43   | 1933.332 | -152.902  | 152.902  | 23379.02  | 8.588%    |
| May           | 2517.63   | 2074.834 | 442.796   | 442.796  | 196068.2  | 17.588%   |
| June          | 2581.35   | 2222.75  | 358.6     | 358.6    | 128594.0  | 13.892%   |
| July          | 3314.15   | 2555.862 | 758.288   | 758.288  | 575000.4  | 22.88%    |
| August        | 2934.56   | 3021.03  | -86.47    | 86.47    | 7477.056  | 2.947%    |
| September     | 4503.34   | 3086.396 | 1416.944  | 1416.944 | 2007730.0 | 31.464%   |
| October       | 3618.3    | 3875.828 | -257.528  | 257.528  | 66320.59  | 7.117%    |
| November      | 5564.48   | 3972.316 | 1592.164  | 1592.164 | 2534986.0 | 28.613%   |
| December      | 2324.7    | 4786.008 | -2461.308 | 2461.308 | 6058039   | 105.876%  |
| TOTALS        | 35521.49  |          | 2368.845  | 8285.262 | 12172550  | 269.098%  |
| AVERAGE       | 2960.124  |          | 236.885   | 828.526  | 1217255.0 | 26.91%    |
| Next perio... |           | 3620.612 | (Bias)    | (MAD)    | (MSE)     | (MAPE)    |
|               |           |          |           | Std err  | 1233.519  |           |

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Method: Weighted Moving Average # Periods to average: 3

(untitled) Solution

|               | Penjualan | Forecast | Error     | Error    | Error^2   | Pct Error |
|---------------|-----------|----------|-----------|----------|-----------|-----------|
| January       | 2807.44   |          |           |          |           |           |
| February      | 1058.67   |          |           |          |           |           |
| March         | 2516.44   |          |           |          |           |           |
| April         | 1780.43   | 2137.309 | -356.879  | 356.879  | 127362.6  | 20.045%   |
| May           | 2517.63   | 1856.881 | 660.749   | 660.749  | 436588.9  | 26.245%   |
| June          | 2581.35   | 2296.232 | 285.118   | 285.118  | 81292.37  | 11.045%   |
| July          | 3314.15   | 2402.05  | 912.1     | 912.1    | 831926.1  | 27.521%   |
| August        | 2934.56   | 2935.006 | -.446     | .446     | .199      | .015%     |
| September     | 4503.34   | 2977.795 | 1525.545  | 1525.545 | 2327287.0 | 33.876%   |
| October       | 3618.3    | 3794.868 | -176.568  | 176.568  | 31176.3   | 4.88%     |
| November      | 5564.48   | 3747.064 | 1817.416  | 1817.416 | 3303000   | 32.661%   |
| December      | 2324.7    | 4768.398 | -2443.698 | 2443.698 | 5971660   | 105.119%  |
| TOTALS        | 35521.49  |          | 2223.336  | 8178.519 | 13110290  | 261.407%  |
| AVERAGE       | 2960.124  |          | 247.037   | 908.724  | 1456699.0 | 29.045%   |
| Next perio... |           | 3555.354 | (Bias)    | (MAD)    | (MSE)     | (MAPE)    |
|               |           |          |           | Std err  | 1368.539  |           |

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**Method** Alpha for smoothing **Note**

Exponential Smoothing 0.00 The best alpha based on the MAD is . The best Alpha based on the MSE is .32 Error analysis begins in period

**(untitled) Solution**

|               | Penjualan | Forecast | Error    | Error   | Error^2   | Pct Error |
|---------------|-----------|----------|----------|---------|-----------|-----------|
| January       | 2807.44   |          |          |         |           |           |
| February      | 1058.67   | 2807.44  | -1748.77 | 1748.77 | 3058196.0 | 165.186%  |
| March         | 2516.44   | 2807.44  | -291     | 291     | 84681     | 11.564%   |
| April         | 1780.43   | 2807.44  | -1027.01 | 1027.01 | 1054749.0 | 57.683%   |
| May           | 2517.63   | 2807.44  | -289.81  | 289.81  | 83989.87  | 11.511%   |
| June          | 2581.35   | 2807.44  | -226.09  | 226.09  | 51116.62  | 8.759%    |
| July          | 3314.15   | 2807.44  | 506.71   | 506.71  | 256755.0  | 15.289%   |
| August        | 2934.56   | 2807.44  | 127.12   | 127.12  | 16159.52  | 4.332%    |
| September     | 4503.34   | 2807.44  | 1695.9   | 1695.9  | 2876077.0 | 37.659%   |
| October       | 3618.3    | 2807.44  | 810.86   | 810.86  | 657494.1  | 22.41%    |
| November      | 5564.48   | 2807.44  | 2757.04  | 2757.04 | 7601270   | 49.547%   |
| December      | 2324.7    | 2807.44  | -482.74  | 482.74  | 233037.9  | 20.766%   |
| TOTALS        | 35521.49  |          | 1832.21  | 9963.05 | 15973530  | 404.705%  |
| AVERAGE       | 2960.124  |          | 166.565  | 905.732 | 1452139.0 | 36.791%   |
| Next perio... |           | 2807.44  | (Bias)   | (MAD)   | (MSE)     | (MAPE)    |
|               |           |          |          | Std err | 1332.23   |           |

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**Method** Alpha for smoothing **Note**

Exponential Smoothing 0.30 Error analysis begins in period 2.

**(untitled) Solution**

|               | Penjualan | Forecast | Error     | Error    | Error^2   | Pct Error |
|---------------|-----------|----------|-----------|----------|-----------|-----------|
| January       | 2807.44   |          |           |          |           |           |
| February      | 1058.67   | 2807.44  | -1748.77  | 1748.77  | 3058196.0 | 165.186%  |
| March         | 2516.44   | 2282.809 | 233.631   | 233.631  | 54583.38  | 9.284%    |
| April         | 1780.43   | 2352.898 | -572.468  | 572.468  | 327720.1  | 32.153%   |
| May           | 2517.63   | 2181.158 | 336.472   | 336.472  | 113213.4  | 13.365%   |
| June          | 2581.35   | 2282.1   | 299.251   | 299.251  | 89550.85  | 11.593%   |
| July          | 3314.15   | 2371.875 | 942.275   | 942.275  | 887882.4  | 28.432%   |
| August        | 2934.56   | 2654.557 | 280.003   | 280.003  | 78401.51  | 9.542%    |
| September     | 4503.34   | 2738.558 | 1764.782  | 1764.782 | 3114455.0 | 39.188%   |
| October       | 3618.3    | 3267.993 | 350.307   | 350.307  | 122715.3  | 9.682%    |
| November      | 5564.48   | 3373.085 | 2191.395  | 2191.395 | 4802212   | 39.382%   |
| December      | 2324.7    | 4030.503 | -1705.803 | 1705.803 | 2909766.0 | 73.377%   |
| TOTALS        | 35521.49  |          | 2371.073  | 10425.16 | 15558700  | 431.183%  |
| AVERAGE       | 2960.124  |          | 215.552   | 947.742  | 1414427.0 | 39.198%   |
| Next perio... |           | 3518.762 | (Bias)    | (MAD)    | (MSE)     | (MAPE)    |
|               |           |          |           | Std err  | 1314.817  |           |

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Method Alpha for smoothing Note

Exponential Smoothing 0.40 Error analysis begins in period 2.

(untitled) Solution

|               | Penjualan | Forecast | Error     | Error    | Error^2   | Pct Error |
|---------------|-----------|----------|-----------|----------|-----------|-----------|
| January       | 2807.44   |          |           |          |           |           |
| February      | 1058.67   | 2807.44  | -1748.77  | 1748.77  | 3058196.0 | 165.186%  |
| March         | 2516.44   | 2107.932 | 408.508   | 408.508  | 166878.8  | 16.234%   |
| April         | 1780.43   | 2271.335 | -490.905  | 490.905  | 240987.9  | 27.572%   |
| May           | 2517.63   | 2074.973 | 442.657   | 442.657  | 195945.0  | 17.582%   |
| June          | 2581.35   | 2252.036 | 329.314   | 329.314  | 108447.9  | 12.757%   |
| July          | 3314.15   | 2383.761 | 930.388   | 930.388  | 865622.6  | 28.073%   |
| August        | 2934.56   | 2755.917 | 178.643   | 178.643  | 31913.43  | 6.088%    |
| September     | 4503.34   | 2827.374 | 1675.966  | 1675.966 | 2808862.0 | 37.216%   |
| October       | 3618.3    | 3497.76  | 120.54    | 120.54   | 14529.84  | 3.331%    |
| November      | 5564.48   | 3545.976 | 2018.504  | 2018.504 | 4074358   | 36.275%   |
| December      | 2324.7    | 4353.377 | -2028.677 | 2028.677 | 4115532.0 | 87.266%   |
| TOTALS        | 35521.49  |          | 1836.168  | 10372.87 | 15681270  | 437.58%   |
| AVERAGE       | 2960.124  |          | 166.924   | 942.989  | 1425570.0 | 39.78%    |
| Next perio... |           | 3541.906 | (Bias)    | (MAD)    | (MSE)     | (MAPE)    |
|               |           |          |           | Std err  | 1319.986  |           |

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Method Alpha for smoothing Note

Exponential Smoothing 0.50 Error analysis begins in period 2.

(untitled) Solution

|               | Penjualan | Forecast | Error     | Error    | Error^2   | Pct Error |
|---------------|-----------|----------|-----------|----------|-----------|-----------|
| January       | 2807.44   |          |           |          |           |           |
| February      | 1058.67   | 2807.44  | -1748.77  | 1748.77  | 3058196.0 | 165.186%  |
| March         | 2516.44   | 1933.055 | 583.385   | 583.385  | 340338.1  | 23.183%   |
| April         | 1780.43   | 2224.748 | -444.318  | 444.318  | 197418.0  | 24.956%   |
| May           | 2517.63   | 2002.589 | 515.041   | 515.041  | 265267.3  | 20.457%   |
| June          | 2581.35   | 2260.109 | 321.241   | 321.241  | 103195.6  | 12.445%   |
| July          | 3314.15   | 2420.73  | 893.42    | 893.42   | 798199.6  | 26.958%   |
| August        | 2934.56   | 2867.44  | 67.12     | 67.12    | 4505.11   | 2.287%    |
| September     | 4503.34   | 2901     | 1602.34   | 1602.34  | 2567493   | 35.581%   |
| October       | 3618.3    | 3702.17  | -83.87    | 83.87    | 7034.156  | 2.318%    |
| November      | 5564.48   | 3660.235 | 1904.245  | 1904.245 | 3626150.0 | 34.221%   |
| December      | 2324.7    | 4612.357 | -2287.657 | 2287.657 | 5233377.0 | 98.407%   |
| TOTALS        | 35521.49  |          | 1322.177  | 10451.41 | 16201170  | 445.998%  |
| AVERAGE       | 2960.124  |          | 120.198   | 950.128  | 1472834.0 | 40.545%   |
| Next perio... |           | 3468.529 | (Bias)    | (MAD)    | (MSE)     | (MAPE)    |
|               |           |          |           | Std err  | 1341.689  |           |

Forecasting/Time Series Analysis Solution Screen Taylor's Introduction to Management Science Textbook Developed by Howard J. Weiss

| (untitled) Solution |                                                      |      |                |          |          |          |          |                       |           |  |
|---------------------|------------------------------------------------------|------|----------------|----------|----------|----------|----------|-----------------------|-----------|--|
|                     | Penjualan                                            | Time | x <sup>2</sup> | x * y    | Forecast | Error    | Error    | (E-Ebar) <sup>2</sup> | Pct Error |  |
| January             | 2807.44                                              | 1    | 1              | 2807.44  | 1834.098 | 973.342  | 973.342  | 947394.3              | 34.67%    |  |
| February            | 1058.67                                              | 2    | 4              | 2117.34  | 2038.83  | -980.16  | 980.16   | 960713.7              | 92.584%   |  |
| March               | 2516.44                                              | 3    | 9              | 7549.32  | 2243.562 | 272.878  | 272.878  | 74462.37              | 10.844%   |  |
| April               | 1780.43                                              | 4    | 16             | 7121.72  | 2448.294 | -667.864 | 667.864  | 446042.2              | 37.511%   |  |
| May                 | 2517.63                                              | 5    | 25             | 12588.15 | 2653.026 | -135.396 | 135.396  | 18332.08              | 5.378%    |  |
| June                | 2581.35                                              | 6    | 36             | 15488.1  | 2857.758 | -276.408 | 276.408  | 76401.36              | 10.708%   |  |
| July                | 3314.15                                              | 7    | 49             | 23199.05 | 3062.49  | 251.66   | 251.66   | 63332.71              | 7.593%    |  |
| August              | 2934.56                                              | 8    | 64             | 23476.48 | 3267.222 | -332.662 | 332.662  | 110663.9              | 11.336%   |  |
| September           | 4503.34                                              | 9    | 81             | 40530.06 | 3471.954 | 1031.386 | 1031.386 | 1063757               | 22.903%   |  |
| October             | 3618.3                                               | 10   | 100            | 36183    | 3676.686 | -58.386  | 58.386   | 3408.895              | 1.614%    |  |
| November            | 5564.48                                              | 11   | 121            | 61209.28 | 3881.418 | 1683.062 | 1683.062 | 2832699.0             | 30.247%   |  |
| December            | 2324.7                                               | 12   | 144            | 27896.4  | 4086.15  | -1761.45 | 1761.45  | 3102706               | 75.771%   |  |
| TOTALS              | 35521.49                                             | 78   | 650            | 260166.3 |          | .002     | 8424.653 | 9699913               | 341.159%  |  |
| AVERAGE             | 2960.124                                             | 6.5  | 54.167         | 21680.53 |          | .0       | 702.054  | 808326.1              | 28.43%    |  |
| Next perio...       |                                                      |      |                |          | 4290.882 | (Bias)   | (MAD)    | (MSE)                 | (MAPE)    |  |
| Intercept           | 1629.366                                             |      |                |          |          |          | Std err  | 984.881               |           |  |
| Slope               | 204.732                                              |      |                |          |          |          |          |                       |           |  |
|                     |                                                      |      |                |          |          |          |          |                       |           |  |
| on Screen           | Taylor's Introduction to Management Science Textbook |      |                |          |          |          |          |                       |           |  |