a. What are the optimal values of α and β?
b. Prepare a line graph comparing the predictions from Holt's method against the original data.
c. What are the forecasts for each of the first six months in 2006 using this technique?
d. Calculate multiplicative seasonal indices for each month using the results of Holt's method.
e. Use these seasonal indices to compute seasonal forecasts for each of the first six months in 2006.
f. Calculate additive seasonal indices for each month using the results of Holt's method.
g. Use these seasonal indices to compute seasonal forecasts for each of the first six months in 2006.

31. Use Holt-Winter's additive method to create a seasonal model that minimizes the MSE for the data set. Use Solver to determine the optimal values of α, β, and γ.
    a. What are the optimal values of α, β, and γ?
    b. Prepare a line graph comparing the predictions from this method against the original data.
    c. What are the forecasts for each of the first six months in 2006 using this technique?
32. Use Holt-Winter's multiplicative method to create a seasonal model that minimizes the MSE for the data set. Use Solver to determine the optimal values of α, β, and γ.
    a. What are the optimal values of α, β, and γ?
    b. Prepare a line graph comparing the predictions from this method against the original data.
    c. What are the forecasts for each of the first six months in 2006 using this technique?

Questions 33 through 36 refer to the data in the file on your data disk named **LaborForce.xls** containing monthly data on the number of workers in the U.S. civilian labor force (in 1000s) from January 1998 through October 2005.

33. Prepare a line graph of these data. Do the data appear to be stationary or nonstationary?
34. Create a Double Moving Average model (with $k = 4$) for the data set.
    a. Prepare a line graph comparing the Double Moving Average predictions against the original data.
    b. What are the forecasts for the next four months using this technique?
35. Use Holt's method to create a model that minimizes the MSE for the data set. Use Solver to estimate the optimal values of α and β.
    a. What are the optimal values of α and β?
    b. Prepare a line graph comparing the predictions from Holt's method against the original data.
    c. What are the forecasts for the next four months using this technique?
36. Use regression analysis to answer the following questions.
    a. Fit a linear trend model to the data set. What is the estimated regression function?
    b. Interpret the R^2 value for your model.
    c. Prepare a line graph comparing the linear trend predictions against the original data.
    d. What are the forecasts for the next two years using this technique?
    e. Fit a quadratic trend model to these data. What is the estimated regression function?
    f. Compare the adjusted-R^2 value for this model to that of the linear trend model. What is implied by this comparison?
    g. Prepare a line graph comparing the quadratic trend predictions against the original data.

h. What are the forecasts for the next two years using this technique?
i. If you had to choose between the linear and quadratic trend models, which would you use? Why?

Questions 37 through 43 refer to the data in the file on your data disk named **MortgageRates.xls** containing average monthly 30-year mortgage rates from January 1999 through October 2005.

37. Prepare a line graph of these data. Do the data appear to be stationary or nonstationary?
38. Compute the two-period and four-period moving average predictions for the data set.
    a. Prepare a line graph comparing the moving average predictions against the original data.
    b. Compute the MSE for each of the two moving averages. Which appears to provide the best fit for this data set?
    c. Compute forecasts for the next two months using the two-period and four-period moving average techniques.
39. Use Solver to determine the weights for a four-period weighted moving average on the data set that minimizes the MSE.
    a. What are the optimal values for the weights?
    b. Prepare a line graph comparing the weighted moving average predictions against the original data.
    c. What are the forecasts for the next two months using this technique?
40. Create an exponential smoothing model that minimizes the MSE for the data set. Use Solver to estimate the optimal value of α.
    a. What is the optimal value of α?
    b. Prepare a line graph comparing the exponential smoothing predictions against the original data.
    c. What are the forecasts for the next two months using this technique?
41. Create a Double Moving Average model (with $k = 4$) for the data set.
    a. Prepare a line graph comparing the Double Moving Average predictions against the original data.
    b. What are the forecasts for the next two months using this technique?
42. Use Holt's method to create a model that minimizes the MSE for the data set. Use Solver to estimate the optimal values of α and β.
    a. What are the optimal values of α and β?
    b. Prepare a line graph comparing the predictions from Holt's method against the original data.
    c. What are the forecasts for the next two months using this technique?
43. Use regression to estimate the parameters of a 6th order polynomial model for this data. That is, estimate the least squares estimates for the parameters in the following estimated regression equation:

$$\hat{Y}_t = b_0 + b_1 t + b_2 t^2 + b_3 t^3 + b_4 t^4 + b_5 t^5 + b_6 t^6$$

    a. What are the optimal values of $b_0, b_1, \ldots, b_6$?
    b. What are the forecasts for the next two months using this technique?
    c. Comment on the appropriateness of this technique.

Questions 44 through 48 refer to the data in the file on your data disk named **ChemicalDemand.xls** containing monthly data on the demand for a chemical product over a two year period.

44. Prepare a line graph of these data. Do the data appear to be stationary or nonstationary?