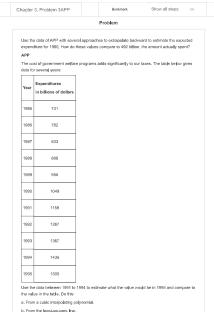
Applied Numerical Analysis (7th Edition)



From each of these, project to find what one would anticipate the expenditures for the year 2000 might be; then find what the actual expenditures were for comparison. Step-by-step solution

From the least-squares quadratic.
 From a cubic spline.

Step 1 of 11 a) When using numerical approximation techniques, it is useful to have programs written to aid in numerical calculations to avoid calculations by hand. Using Wallab, create an Martin around "lagrangs, an" winch will contain Mallab code that insplanness the algorithm to interpolate Lagrang explorenish and return the coefficients of the optionnal in Lagrange form Insists the fig. write the code to implement the method. One example of a correctly executable routine based on the algorithm description in the text is as follows: function ms – lagrange (X, E, xb). Sigvien a vector fact of variables and a vector. %list of v-values the lagrangian interpolation of %x0 is calculated. n = length (X); coeffmatrix = zeros(1,n); P=1; coeff=1; for j = 1:nif $(j \sim = i)$ $P = P^*(x0-X(j))/(X(i)-X(j))$: coeff=coeff/(X(i)-X(j)); >> x=[0,1,2,3,4,5,6,7,8,9,10]; >> f=[731,782,833,886,956,1049,1159,1267,1367,1436,1505];

Step 3 of 11

b) For almost all least-squares problems in this text, the data can be fit to a **linear combination** of **basis functions** $\{1,x_1,x_2,\dots,x_s\}$ (these are function vectors such as $x,y,-x^3$, $-|\mathbf{l}_1x,-\mathbf{e}^x|$, and so forth) of the form

 $y = \beta_1 + \beta_2 x_1 + \beta_3 x_2 + \cdots + \beta_{n+1} x_n$

which when fitting the equation to m data points leads to the system of equations (ex-compactly in matrix notation)

 $\sum_{i=1}^{n+1} X_{ij} \beta_j = y_i, (i = 1, 2, ..., m),$

$$\begin{split} & \sum_{d_{i} = (J_{i})^{d_{i}} = (J_{i})^{d_{i}} = (J_{i})^{d_{i}} = (J_{i})^{d_{i}} \\ & \mathbf{X} = \begin{bmatrix} X_{i_{1}} & X_{i_{2}} & \cdots & X_{i_{d} = 0} \\ X_{i_{1}} & X_{i_{2}} & \cdots & X_{i_{d} = 0} \\ \vdots & \vdots & \ddots & \vdots \\ X_{ai} & X_{ai} & \cdots & X_{a_{d} = (i)} \end{bmatrix}, \quad \boldsymbol{\beta} = \begin{bmatrix} \beta_{i} \\ \beta_{i} \\ \vdots \\ \beta_{a+1} \end{bmatrix}, \quad \mathbf{y} = \begin{bmatrix} y_{i} \\ y_{2} \\ \vdots \\ y_{a} \end{bmatrix} \end{split}$$

which is known as the general linear least-squares model.

640226

Step 4 of 11

The get the least squares solution to the system, the deviation function

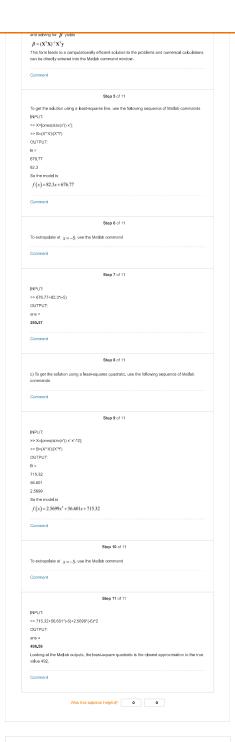
 $S(\boldsymbol{\beta}) = \|\mathbf{y} - \mathbf{X}\boldsymbol{\beta}\|^{2}$ $= (\mathbf{y} - \mathbf{X}\boldsymbol{\beta})^{T} (\mathbf{y} - \mathbf{X}\boldsymbol{\beta})$

 $= (\mathbf{y} - \mathbf{X}\boldsymbol{\beta}) \cdot (\mathbf{y} - \mathbf{X}\boldsymbol{\beta})$ $= \mathbf{y}^{\mathsf{T}} \mathbf{y} - \boldsymbol{\beta}^{\mathsf{T}} \mathbf{Y}^{\mathsf{T}} \mathbf{y} - \mathbf{y}^{\mathsf{T}} \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\beta}^{\mathsf{T}}^{\mathsf{T}} \mathbf{X}\boldsymbol{\beta}$ $= \mathbf{y}^{\mathsf{T}} \mathbf{y} - \mathbf{Z}\boldsymbol{\beta}^{\mathsf{T}} \mathbf{Y}^{\mathsf{T}} \mathbf{y} + \boldsymbol{\beta}^{\mathsf{T}} \mathbf{Y}^{\mathsf{T}} \mathbf{X}\boldsymbol{\beta}$ must be minimized, so differentiating with respect to $\boldsymbol{\beta}$ and setting $S(\boldsymbol{\beta}) = 0$ yields the normal









Recommended solutions for you in Chapter 3

Ungete 3, Problem 76E

If the date of Exercise are plotted on boyking pages, the priorits appear to be nearly freeze with a slope of Z. That means that a quadratic, Z =

TEXTROOK LÍNES STUDINT SERMICES COMPANY LEADÁING SERVICES
Réturn Tour Brobles
Cropp Bay
Textroplas Bental
Study 301 Cuntemer Service
Called Referencia
Alberta Compa Study Herita
Alberta Compa Study
Compa



