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0001 clear all
0002
0003 y = [2 5 7 9 10 13 20]';
0004 X1 = [14 16 27 42 39 50 83];
0005 X2 = [70 75 144 190 210 235 400];
0006 n = length(y); k = 2;
0007 X = [ones(1,n); X1; X2]';
0008 C = inv(X'*X);
0009 Xy = X'*y;
0010 b = C*Xy;
0011 yhat = X*b;
0012 E = y - yhat;
0013 SSE = sum(E.*E);
0014 SSY = sum(y.*y);
0015 SS0 = n*mean(y)*mean(y);
0016 SST = SSY - SS0;
0017 SSR = SST - SSE;
0018 R2 = SSR/SST;
0019 Se = sqrt(SSE/(n-3));
0020 Sb = Se*sqrt(diag(C));
0021 ConfidenceLevel = 90;
0022 p = 1-(1 - ConfidenceLevel/100)/2;
0023 t_p = tinvp(p, n-k-1);
0024
0025 Ub = b + Sb*t_p;
0026 Lb = b - Sb*t_p;
0027
0028 xp = [1 100 550]';
0029 yp = xp'*b;
0030
0031 Sylp = Se*sqrt(1+xp'*C*xp);
0032 Uylp = yp + t_p*Sylp;
0033 Lylp = yp - t_p*Sylp;
0034
0035 Syp = Se*sqrt(xp'*C*xp);
0036 Uyp = yp + t_p*Syp;
0037 Lyp = yp - t_p*Syp;
0038
0039 fprintf('=====\n');
0040 fprintf('=====\n');
0041 fprintf('The matrix X is equal to\n'); X
0042 fprintf('The coefficients b are equal to\n'); b
0043 fprintf('The error vector e is equal to\n'); E
0044 fprintf('SSE = %7.4f, SSY = %7.4f, SS0 = %7.4f\n', SSE, SSY, SS0);
0045 fprintf('SST = %7.4f, SSR = %7.4f, R2 = %7.4f\n', SST, SSR, R2);
0046 fprintf('Correlation R = %7.4f\n', sqrt(R2));
0047 fprintf('Standard dev of errors (Se) = %7.4f\n', Se);
0048 fprintf('t quantile for confid level of %7.3f and %2d degrees of freedom = %7.4f\n', ConfidenceLevel, n-k-1, t_p);
0049 fprintf('Upper limits for b-coefficients: '); fprintf('%7.4f ', Ub); fprintf('\n');
0050 fprintf('Lower limits for b-coefficients: '); fprintf('%7.4f ', Lb); fprintf('\n');
0051 fprintf('Response for x1 = %7.4f and x2 = %7.4f is %7.4f\n', xp(2), xp(3), yp);
0052 fprintf('Standard dev for response (1 observation) = %7.4f\n', Sylp);
0053 fprintf('Upper limit = %7.4f - Lower limit = %7.4f\n', Uylp, Lylp);
0054 fprintf('Standard dev for response (inf observation) = %7.4f\n', Syp);
0055 fprintf('Upper limit = %7.4f - Lower limit = %7.4f\n', Uyp, Lyp);
0056 %
0057 % ANOVA
0058 MSR = SSR/k; MSE = SSE/(n-k-1);
0059 f_p = finv(ConfidenceLevel/100, k, n-k-1);
0060 fprintf('-----\n');
0061 fprintf('Compo Sum of %%Var DF Mean \n');
0062 fprintf('nent Squares Square \n');
0063 fprintf('-----\n');
0064 fprintf(' y SSY = %7.3f n = %1d\n', SSY, n);
0065 fprintf(' y_bar SS0 = %7.3f 1\n', SS0);
0066 fprintf(' y-yp SST = %7.3f 100 n-1 = %1d\n', SST, n-1);
0067 fprintf(' Model SSR = %7.3f %3.1f%% k = %1d MSR = %7.3f\n', SSR, 100*SSR/SST, k, MSR/k);
0068 fprintf(' Errors SSE = %7.3f %3.1f%% n-k-1 = %1d MSE = %7.3f\n', SSE, 100*SSE/SST, n-k-1, SSE/(n-k-1));
0069 fprintf(' (MSR/MSE): F-Computed = %7.3f, F-Table = %7.3f\n', MSR/MSE, f_p);
0070 if (MSR/MSE) > f_p
0071 fprintf('Regression passed F-test\n');
0072 fprintf('Hypothesis of all zero coefficients can not be accepted at %3.1f%% confidence level\n',...
0073 ConfidenceLevel);
0074 else
0075 fprintf('Regression failed F-test\n');
0076 fprintf('The null hypothesis can not be rejected at %3.1f%% confidence level\n',...
0077 ConfidenceLevel);
0078 end

```