

```
> with(linalg):
Warning, the protected names norm and trace have been redefined and unprotected
> X := matrix([[1, 740, 1.10],
> [1, 740, 0.62],
> [1, 740, 0.31],
> [1, 805, 1.10],
> [1, 805, 0.62],
> [1, 805, 0.31],
> [1, 980, 1.10],
> [1, 980, 0.62],
> [1, 980, 0.31],
> [1, 1235, 1.10],
> [1, 1235, 0.62],
> [1, 1235, 0.31]]);

      [1  740  1.10]
      [
      ]
      [1  740  0.62]
      [
      ]
      [1  740  0.31]
      [
      ]
      [1  805  1.10]
      [
      ]
      [1  805  0.62]
      [
      ]
      [1  805  0.31]
X := [
      ]
      [1  980  1.10]
      [
      ]
      [1  980  0.62]
      [
      ]
      [1  980  0.31]
      [
      ]
      [1 1235  1.10]
      [
      ]
      [1 1235  0.62]
      [
      ]
      [1 1235  0.31]

> Y := matrix([[ 0.231],
> [0.107],
> [0.053],
> [0.129],
> [0.069],
> [0.030],
> [1.005],
> [0.559],
> [0.321],
> [2.948],
> [1.633],
> [0.934]]);
```

```

[0.231]
[      ]
[0.107]
[      ]
[0.053]
[      ]
[0.129]
[      ]
[0.069]
[      ]
[0.030]
Y := [      ]
[1.005]
[      ]
[0.559]
[      ]
[0.321]
[      ]
[2.948]
[      ]
[1.633]
[      ]
[0.934]

```

```

> XTX:=evalm(transpose(X) &* X);
      [ 12      11280      8.12]
      [      ]
XTX := [11280  11043750  7632.80]
      [      ]
      [ 8.12   7632.80   6.7620]

```

```

> IXTX:= inverse(XTX);
      [ 2.450262354  -0.002133696516  -0.5338733432]
      [      ]
IXTX := [-0.002133696516  0.000002269889910  -0.]
      [      ]
      [-0.5338733432      -0.   0.7889753840]

```

```

> H:=evalm( X &* IXTX &* transpose(X)):
> for i from 1 to 12 do
> for j from 1 to 12 do
> printf("%9.4f",H[i,j])
> od;
> printf("\n\n",1) ;od;
.3155   .1552   .0517   .2860   .1257   .0222   .2066   .0462  -.0573   .0908  -.0695  -.1731
.1552   .1767   .1905   .1257   .1472   .1610   .0462   .0677   .0816  -.0695  -.0481  -.0342
.0517   .1905   .2802   .0222   .1610   .2507  -.0573   .0816   .1712  -.1731  -.0342   .0555
.2860   .1257   .0222   .2661   .1058   .0022   .2125   .0521  -.0514   .1343  -.0260  -.1295
.1257   .1472   .1610   .1058   .1272   .1411   .0521   .0736   .0875  -.0260  -.0045   .0093
.0222   .1610   .2507   .0022   .1411   .2308  -.0514   .0875   .1771  -.1295   .0093   .0990
.2066   .0462  -.0573   .2125   .0521  -.0514   .2284   .0680  -.0355   .2515   .0912  -.0123
.0462   .0677   .0816   .0521   .0736   .0875   .0680   .0895   .1034   .0912   .1127   .1265
-.0573   .0816   .1712  -.0514   .0875   .1771  -.0355   .1034   .1930  -.0123   .1265   .2162
.0908  -.0695  -.1731   .1343  -.0260  -.1295   .2515   .0912  -.0123   .4223   .2619   .1584
-.0695  -.0481  -.0342  -.0260  -.0045   .0093   .0912   .1127   .1265   .2619   .2834   .2973
-.1731  -.0342   .0555  -.1295   .0093   .0990  -.0123   .1265   .2162   .1584   .2973   .3869

> Ones := matrix(12,1,1);

```

```

[1]
[ ]
[1]
[ ]
[1]
[ ]
[1]
[ ]
[1]
[ ]
[1]
[ ]
Ones := [ ]
[1]
[ ]
[1]
[ ]
[1]
[ ]
[1]
[ ]
[1]
[ ]
[1]

```

```

> ybar := scalarmul(evalm(transpose(Ones) &* Y),1/12);
      ybar := [0.668250000]
> SST := evalm( transpose(Y) &* Y- ybar&*ybar*12 );
      SST := [8.386520250]
> yhat := evalm( H &* Y);
      [ 0.3460566379]
      [                ]
      [-0.1087908269]
      [                ]
      [-0.4025464814]
      [                ]
      [ 0.5811433028]
      [                ]
      [ 0.1262958381]
      [                ]
      [-0.1674598165]
yhat := [                ]
      [ 1.214068899]
      [                ]
      [ 0.7592214336]
      [                ]
      [ 0.4654657790]
      [                ]
      [ 2.136331925]
      [                ]
      [ 1.681484459]
      [                ]
      [ 1.387728805]
> SSR := evalm( transpose(yhat) &* yhat- ybar&*ybar*12 );
      SSR := [6.900792720]
> eps := evalm(Y - yhat);
      [-0.1150566379]
      [                ]
      [ 0.2157908269]
      [                ]
      [ 0.4555464814]
      [                ]
      [-0.4521433028]
      [                ]
      [-0.0572958381]
      [                ]
      [ 0.1974598165]
eps := [                ]
      [ -0.209068899]
      [                ]
      [-0.2002214336]
      [                ]
      [-0.1444657790]
      [                ]
      [ 0.811668075]
      [                ]

```

```

[ -0.048484459]
[                ]
[ -0.453728805]

> SSE := evalm( transpose(eps) &* eps);
SSE := [1.485727490]

> evalm(SST-SSE-SSR);
[4.0 e-08]

> MSE := evalm(SSE/9);
MSE := [0.1650808322]

> s2 := MSE[1,1];
s2 := 0.1650808322

> s2beta := scalarmul(IXTX,s2);
s2beta := [ 0.4044913485 -0.0003522323965 -0.08813225578]
[ -0.0003522323965 3.747153153 e-07 -0.]
[ -0.08813225578 -0. 0.1302447130]

> sqrt(s2beta[1,1]); sqrt(s2beta[2,2]); sqrt(s2beta[3,3]);
0.6359963431
0.0006121399475
0.3608943239

> MSR := SSR[1,1]/2.0;
MSR := 3.450396360

> F:= MSR/MSE[1,1];
F := 20.90125373

> with(stats):
Warning, these names have been redefined: anova, describe, fit, importdata, random, statevalf,
statplots, transform

> 1-stats[statevalf,cdf,fratio[2,9]](F);
0.0004145798

```