In[218]:=

```
(*Зад 3*)
p = 1;
q = 3;
n = 8;
a = 0;
b = 0.97;
z = 0.101 * p;
```

In[224]:=

```
xx = {0, 0.1 * p, 0.21 * q, 0.23, 0.35, 0.46, 0.71, 0.97}
yy = {2.01, 2.47, 2.80, 2.87, 3.17, 3.44, 3.56, 3.33}
```

Out[224]=

$$\{0, 0.1, 0.63, 0.23, 0.35, 0.46, 0.71, 0.97\}$$

Out[225]=

$$\{2.01, 2.47, 2.8, 2.87, 3.17, 3.44, 3.56, 3.33\}$$

In[226]:=

```
A = ( n                  Sum[xx[[i]], {i, 1, n}]
      Sum[xx[[i]], {i, 1, n}]   Sum[xx[[i]]^2, {i, 1, n}] );
MatrixForm[A]
d = {Sum[yy[[i]], {i, 1, n}], Sum[xx[[i]] * yy[[i]], {i, 1, n}]}
k = LinearSolve[A, d]
P1[x_] := k[[2]] x + k[[1]]
P1[x]
```

Out[227]//MatrixForm=

$$\begin{pmatrix} 8 & 3.45 \\ 3.45 & 2.2389 \end{pmatrix}$$

Out[228]=

$$\{23.65, 11.1207\}$$

Out[229]=

$$\{2.42708, 1.22707\}$$

Out[231]=

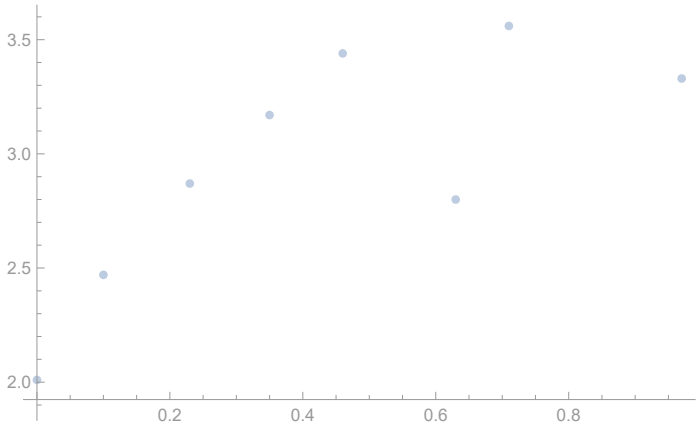
$$2.42708 + 1.22707\, x$$

In[232]:=

```
(*Извод: Полиномът от първа степен е P1*(x)= 1.22707x + 2.42708 *)
```

```
points = Table[{xx[[i]], yy[[i]]}, {i, 1, n}];
grpoints = ListPlot[points]
```

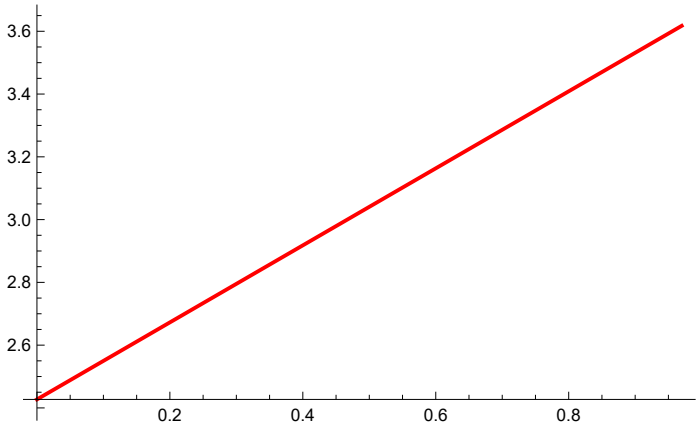
Out[234]=




In[235]:=

```
(*Графика на полинома от първа степен*)
grP1 = Plot[P1[x], {x, a, b}, PlotStyle → Red]
```

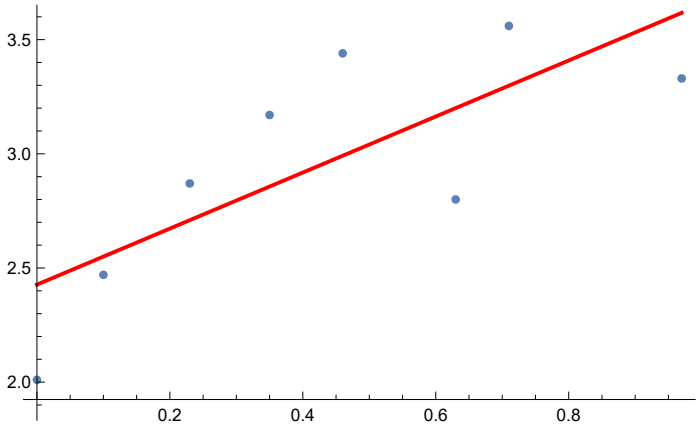
Out[235]=




In[236]:=

```
Show[grpoints, grP1]
```

Out[236]=



In[237]:=

$$\text{errP1} = \sqrt{\sum_{i=1}^{n} (yy[\![i]\!] - P1[xx[\![i]\!]])^2}$$

Out[237]=

0.9037

In[238]:=

```
(*полином от втора степен*)
A = {{n, Sum[xx[[i]], {i, 1, n}], Sum[xx[[i]]^2, {i, 1, n}]},
     {Sum[xx[[i]], {i, 1, n}], Sum[xx[[i]]^2, {i, 1, n}], Sum[xx[[i]]^3, {i, 1, n}]},
     {Sum[xx[[i]]^2, {i, 1, n}], Sum[xx[[i]]^3, {i, 1, n}], Sum[xx[[i]]^4, {i, 1, n}]}};
MatrixForm[A]
d = {Sum[yy[[i]], {i, 1, n}], Sum[xx[[i]] * yy[[i]], {i, 1, n}], Sum[xx[[i]]^2 * yy[[i]], {i, 1, n}]}
k = LinearSolve[A, d]
P2[x_] := k[[3]] x^2 + k[[2]] x + k[[1]]
P2[x]
```

Out[239]//MatrixForm=

$$\begin{pmatrix} 8 & 3.45 & 2.2389 \\ 3.45 & 2.2389 & 1.67401 \\ 2.2389 & 1.67401 & 1.35962 \end{pmatrix}$$

Out[240]=

{23.65, 11.1207, 7.33187}

Out[241]=

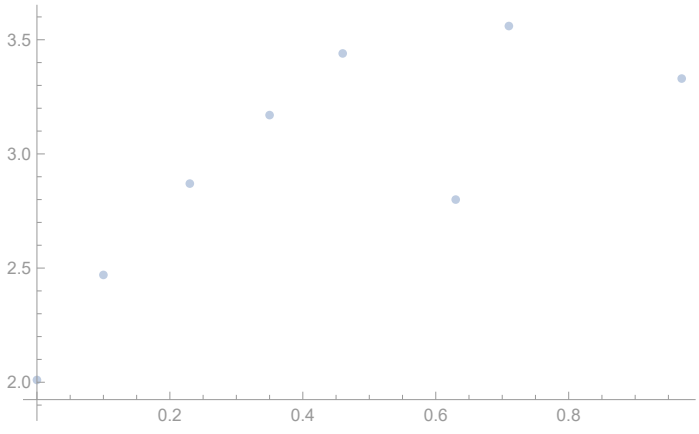
{2.12075, 3.50361, −2.41344}

Out[243]=

$$2.12075 + 3.50361\,x - 2.41344\,x^2$$

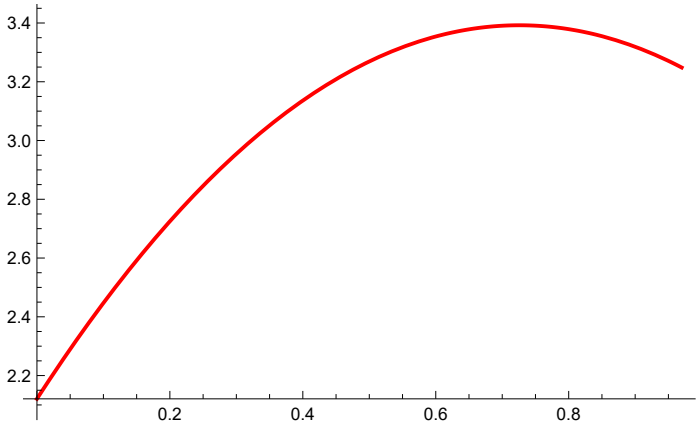
```
points = Table[{xx[[i]], yy[[i]]}, {i, 1, n}];
grpoints = ListPlot[points]
```

Out[245]=

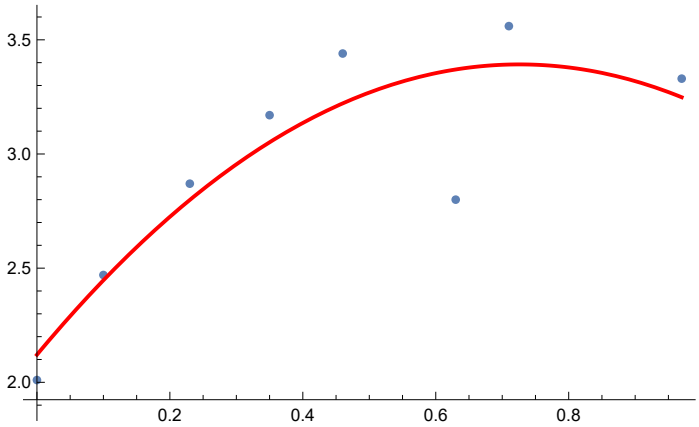


In[246]:=
```
grP2 = Plot[P2[x], {x, a, b}, PlotStyle → Red]
Show[grpoints, grP2]
```

Out[246]=




Out[247]=




In[248]:=
```
errP2 = √(∑_{i=1}^{n} (yy[[i]] - P2[xx[[i]]])^2)
```

Out[248]=
```
0.663017
```

In[249]:=
```
(*г)двата полинома в точката z=0.101*p *)
P1[z]
```

Out[249]=
```
2.47461
```

In[250]:=
```
P2[z]
```

Out[250]=
```
2.44999
```

In[251]:=
```
(*Зад 4*)
Clear[b, m, P, c, r, P, x1]
```

In[252]:=

$$P = \begin{pmatrix} \text{min} & \square & 0 & -3 & 0 & -2 & 0 & 0 & 30 & 30 \\ \text{ЦБ} & \text{БН} & b & x1 & x2 & x3 & x4 & x5 & x6 & x7 \\ 30 & x6 & 4 & 1 & 1 & 2 & 0 & 0 & 1 & 0 \\ 30 & x7 & 2 & 0 & 1 & 1 & -1 & 0 & 0 & 1 \\ 0 & x5 & 5 & 2 & 1 & 2 & 0 & 1 & 0 & 0 \\ \square & Z & \square & \square & \square & \square & \square & \square & \square & \square \end{pmatrix};$$

```
m = Length[P]; n = Length[P[[1]]];
For[j = 3, j ≤ n, j++, P[[m,j]] = Sum[P[[i,1]] P[[i,j]], {i, 3, m-1}] - P[[1,j]]];
Grid[P, Frame → All]
```

In[255]:=

| min | □ | 0 | -3 | 0 | -2 | 0 | 0 | 30 | 30 |
|---|---|---|---|---|---|---|---|---|---|
| ЦБ | БН | b | x1 | x2 | x3 | x4 | x5 | x6 | x7 |
| 30 | x6 | 4 | 1 | 1 | 2 | 0 | 0 | 1 | 0 |
| 30 | x7 | 2 | 0 | 1 | 1 | -1 | 0 | 0 | 1 |
| 0 | x5 | 5 | 2 | 1 | 2 | 0 | 1 | 0 | 0 |
| □ | Z | 180 | 33 | 60 | 92 | -30 | 0 | 0 | 0 |

In[256]:=

```
c = 6; r = 4;
P[[r,1]] = P[[1,c]]; P[[r,2]] = P[[2,c]];
rab = P[[r,c]];
For[j = 3, j ≤ n, j++, P[[r,j]] = P[[r,j]] / rab];
For[i = 3, i ≤ m, i++, If[i ≠ r, rab = P[[i,c]];
  For[j = 3, j ≤ n, j++, P[[i,j]] = P[[i,j]] - rab * P[[r,j]]]]]
Grid[P, Frame → All]
```

In[262]:=

| min | □ | 0 | -3 | 0 | -2 | 0 | 0 | 30 | 30 |
|---|---|---|---|---|---|---|---|---|---|
| ЦБ | БН | b | x1 | x2 | x3 | x4 | x5 | x6 | x7 |
| 30 | x6 | 0 | 1 | -1 | 0 | 2 | 0 | 1 | -2 |
| -2 | x3 | 2 | 0 | 1 | 1 | -1 | 0 | 0 | 1 |
| 0 | x5 | 1 | 2 | -1 | 0 | 2 | 1 | 0 | -2 |
| □ | Z | -4 | 33 | -32 | 0 | 62 | 0 | 0 | -92 |

In[263]:=

```
c = 7; r = 3;
P[[r,1]] = P[[1,c]]; P[[r,2]] = P[[2,c]];
rab = P[[r,c]];
For[j = 3, j ≤ n, j++, P[[r,j]] = P[[r,j]] / rab];
For[i = 3, i ≤ m, i++, If[i ≠ r, rab = P[[i,c]];
  For[j = 3, j ≤ n, j++, P[[i,j]] = P[[i,j]] - rab * P[[r,j]]]]]
Grid[P, Frame → All]
```

In[269]:=

| min | □ | 0 | -3 | 0 | -2 | 0 | 0 | 30 | 30 |
|---|---|---|---|---|---|---|---|---|---|
| ЦБ | БН | b | x1 | x2 | x3 | x4 | x5 | x6 | x7 |
| 0 | x4 | 0 | $\frac{1}{2}$ | $-\frac{1}{2}$ | 0 | 1 | 0 | $\frac{1}{2}$ | -1 |
| -2 | x3 | 2 | $\frac{1}{2}$ | $\frac{1}{2}$ | 1 | 0 | 0 | $\frac{1}{2}$ | 0 |
| 0 | x5 | 1 | 1 | 0 | 0 | 0 | 1 | -1 | 0 |
| □ | Z | -4 | 2 | -1 | 0 | 0 | 0 | -31 | -30 |

In[270]:=

```
c = 4; r = 3;
P[[r,1]] = P[[1,c]]; P[[r,2]] = P[[2,c]];
rab = P[[r,c]];
For[j = 3, j ≤ n, j++, P[[r,j]] = P[[r,j]] / rab];
For[i = 3, i ≤ m, i++, If[i ≠ r, rab = P[[i,c]];
  For[j = 3, j ≤ n, j++, P[[i,j]] = P[[i,j]] - rab * P[[r,j]]]]]
Grid[P, Frame → All]
```

In[276]:=

| min | □ | 0 | -3 | 0 | -2 | 0 | 0 | 30 | 30 |
|---|---|---|---|---|---|---|---|---|---|
| ЦБ | БН | b | x1 | x2 | x3 | x4 | x5 | x6 | x7 |
| -3 | x1 | 0 | 1 | -1 | 0 | 2 | 0 | 1 | -2 |
| -2 | x3 | 2 | 0 | 1 | 1 | -1 | 0 | 0 | 1 |
| 0 | x5 | 1 | 0 | 1 | 0 | -2 | 1 | -2 | 2 |
| □ | Z | -4 | 0 | 1 | 0 | -4 | 0 | -33 | -26 |

In[277]:=

```
c = 5; r = 5;
P[[r,1]] = P[[1,c]]; P[[r,2]] = P[[2,c]];
rab = P[[r,c]];
For[j = 3, j ≤ n, j++, P[[r,j]] = P[[r,j]] / rab];
For[i = 3, i ≤ m, i++, If[i ≠ r, rab = P[[i,c]];
  For[j = 3, j ≤ n, j++, P[[i,j]] = P[[i,j]] - rab * P[[r,j]]]]]
Grid[P, Frame → All]
```

Out[282]=

| min | □ | 0 | -3 | 0 | -2 | 0 | 0 | 30 | 30 |
|---|---|---|---|---|---|---|---|---|---|
| ЦБ | БН | b | x1 | x2 | x3 | x4 | x5 | x6 | x7 |
| -3 | x1 | 1 | 1 | 0 | 0 | 0 | 1 | -1 | 0 |
| -2 | x3 | 1 | 0 | 0 | 1 | 1 | -1 | 2 | -1 |
| 0 | x2 | 1 | 0 | 1 | 0 | -2 | 1 | -2 | 2 |
| □ | Z | -5 | 0 | 0 | 0 | -2 | -1 | -31 | -28 |

In[283]:=

```
(* Z_min=-5 => Z_max=5; X=1,1,1 *)
```