Blatt 3

```
clc;clear;
format long;
```

Aufgabe 1

```
Ni0=linquadref(0,0)
```

```
Ni0 = 4×1
   0.250000000000000
   0.250000000000000
   0.250000000000000
   0.250000000000000
```

```
Ni0577=linquadref(0.577,-0.577)
```

```
Ni0577 = 4×1
   0.166767750000000
   0.621732250000000
   0.166767750000000
   0.044732250000000
```

Aufgabe 2

```
x_node=[-1,-1;+1,-1;+1,+1;-1,+1];
y_node=[0;1;3;1];
val0=0;
% f_L=0,0
for i=1:4
    val0=val0+Ni0(i).*y_node(i);
end
val0
```

```
val0 =
   1.250000000000000
```

```
% f_L=0.577,-0.577
val0577=0;
for i=1:4
    val0577=val0577+Ni0577(i).*y_node(i);
end
val0577
```

```
val0577 =
   1.166767750000000
```

Aufgabe 3

```
dNi0=linquadderivref(0,0)
```

```
dNi0 = 4×2
  -0.250000000000000  -0.250000000000000
   0.250000000000000  -0.250000000000000
   0.250000000000000   0.250000000000000
  -0.250000000000000   0.250000000000000
```

```
dNi0577=linquadderivref(0.577,-0.577)
```

```
dNi0577 = 4×2
  -0.394250000000000  -0.105750000000000
   0.394250000000000  -0.394250000000000
   0.105750000000000   0.394250000000000
  -0.105750000000000   0.105750000000000
```

Aufgabe 4

```
x_node=[-1,-1;+1,-1;+1,+1;-1,+1];
y_node=[0;1;3;1];
dxi=0;deta=0;
% f_L=0,0
for i=1:4
    dxi=dxi+dNi0(i,1).*y_node(i);
    deta=deta+dNi0(i,2).*y_node(i);
end
dxi
```

```
dxi =
   0.750000000000000
```

```
deta
```

```
deta =
   0.750000000000000
```

```
% f_L=0.577,-0.577
dxi=0;deta=0;
for i=1:4
    dxi=dxi+dNi0577(i,1).*y_node(i);
    deta=deta+dNi0577(i,2).*y_node(i);
end
dxi
```

```
dxi =
   0.605750000000000
```

```
deta
```

```
deta =
   0.894250000000000
```

```
function val = linquadref(xi,eta)
N1 = 0.25 * (1 - xi) * (1 - eta);
N2 = 0.25 * (1 + xi) * (1 - eta);
N3 = 0.25 * (1 + xi) * (1 + eta);
N4 = 0.25 * (1 - xi) * (1 + eta);
val = [N1;N2;N3;N4];
end
```

```
function deriv = linquadderivref(xi,eta)
a11 = eta/4 - 1/4;% dN1/dxi dN1/deta
a12 = xi/4 - 1/4;
a21 = 1/4 - eta/4;
a22 = - xi/4 - 1/4;
a31 = eta/4 + 1/4;
a32 = xi/4 + 1/4 ;
a41 = - eta/4 - 1/4;
a42 = 1/4 - xi/4;
deriv = [a11 a12;
         a21 a22;
         a31 a32;
         a41 a42];
end
```