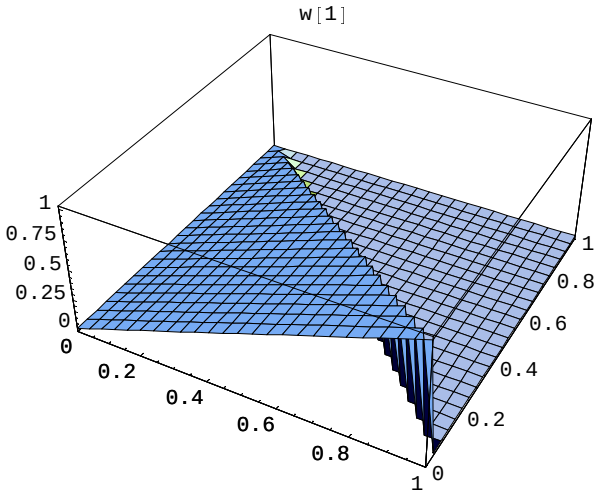
w[n,x,y]=Nodal hat function of node n at {x,y} in the regime of the triangel {{0,0},{1,0},{1,1}}
gw[n]=gradient of the hat function n

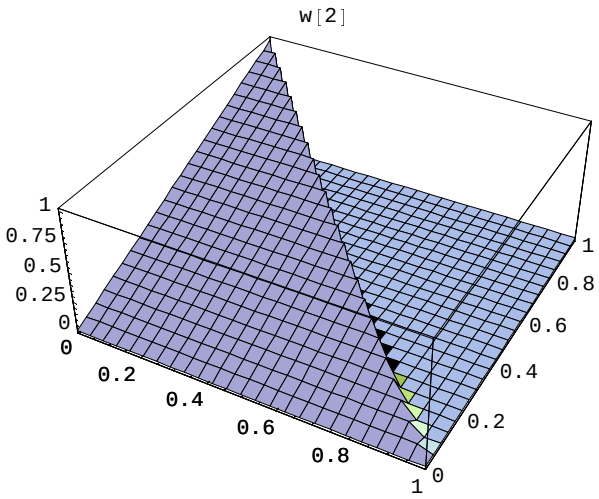
In[43]:=

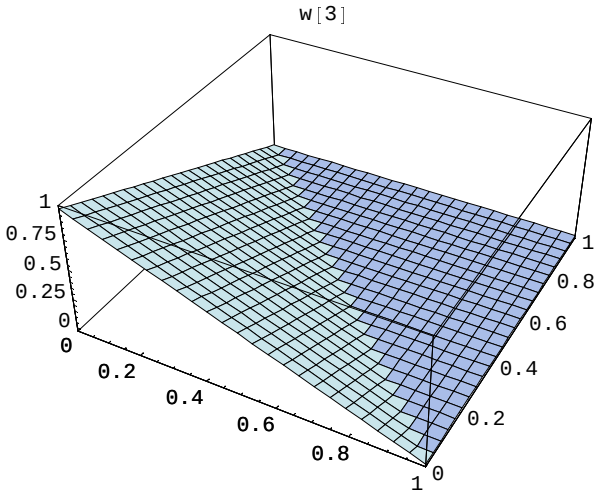
```
Clear[w];
w[n_, x_, y_] := 0 /; x + y > 1;
w[1, x_, y_] := x /; x + y <= 1;
w[2, x_, y_] := y /; x + y <= 1;
gw[1] = {1, 0};
gw[2] = {0, 1};
w[3, x_, y_] := 1 - x - y /; x + y <= 1;
gw[3] = -{1, 1};
```

In[51]:=

```
Table[
 Plot3D[w[n, x, y], {x, 0, 1}, {y, 0, 1}, PlotLabel → w[n]],
 {n, 1, 3}]
```

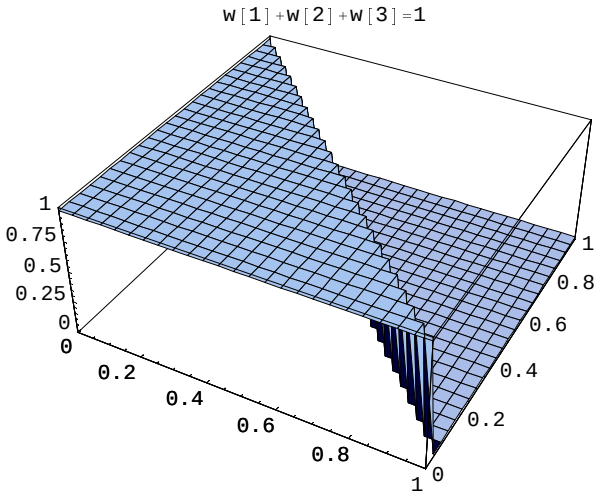






Out[51]= {- SurfaceGraphics -, - SurfaceGraphics -, - SurfaceGraphics -}

In[53]:=
```
Plot3D[w[1, x, y] + w[2, x, y] + w[3, x, y],
 {x, 0, 1}, {y, 0, 1}, PlotLabel → "w[1]+w[2]+w[3]=1"]
```



Out[53]= - SurfaceGraphics -

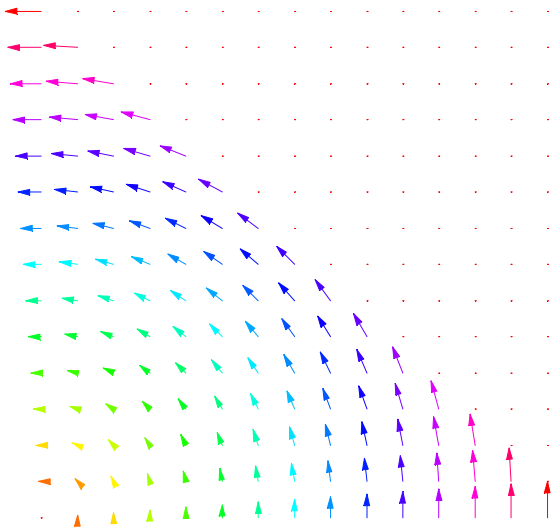
Edge Whitney Functions as defined by e_ij=w[i]grad[w[j]]-w[j]grad[w[i]]

In[14]:=
```
we[1, x_, y_] := w[1, x, y] gw[2] - w[2, x, y] gw[1];
we[2, x_, y_] := w[2, x, y] gw[3] - w[3, x, y] gw[2];
we[3, x_, y_] := w[3, x, y] gw[1] - w[1, x, y] gw[3];
```

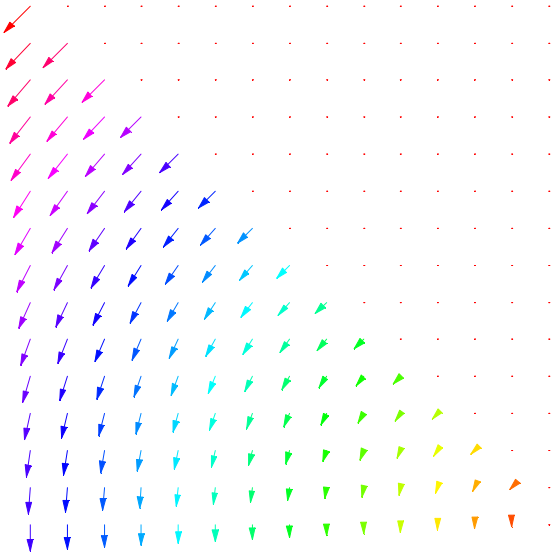
In[54]:=
```
<< Graphics`PlotField`
```

In[56]:=
```
Table[
 PlotVectorField[we[n, x, y], {x, 0, 1},
  {y, 0, 1}, ColorFunction → Hue, PlotLabel → we[n]],
 {n,
  1,
  3}]
```

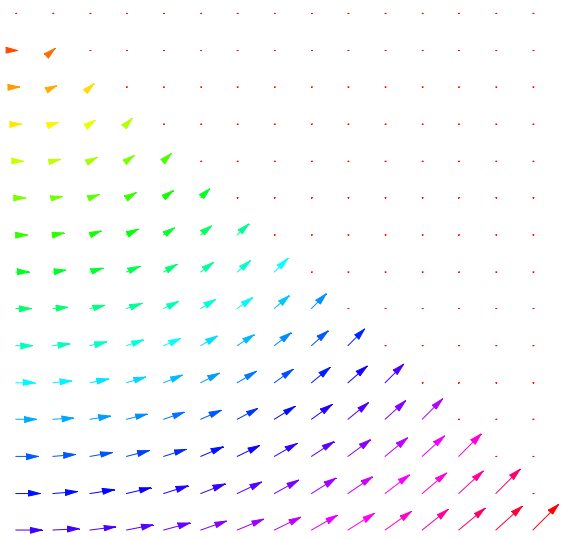
we[1]



we[2]

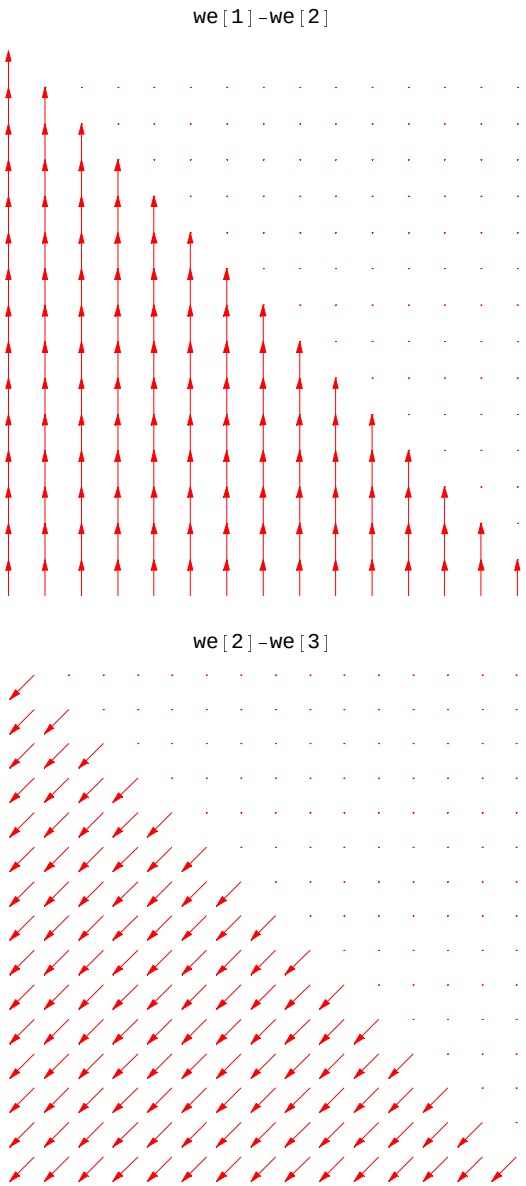


we[3]



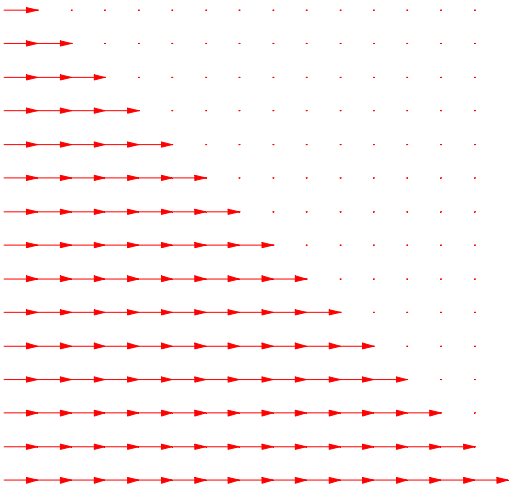
Out[56]= {- Graphics -, - Graphics -, - Graphics -}

In[60]:=
```
PlotVectorField[we[1, x, y] - we[2, x, y], {x, 0, 1},
  {y, 0, 1}, ColorFunction → Hue, PlotLabel → "we[1]-we[2]"];
PlotVectorField[we[2, x, y] - we[3, x, y], {x, 0, 1}, {y, 0, 1},
 ColorFunction → Hue, PlotLabel → "we[2]-we[3]"]
PlotVectorField[we[3, x, y] - we[1, x, y], {x, 0, 1},
 {y, 0, 1}, ColorFunction → Hue, PlotLabel → "we[3]-we[1]"]
```



Out[61]= - Graphics -

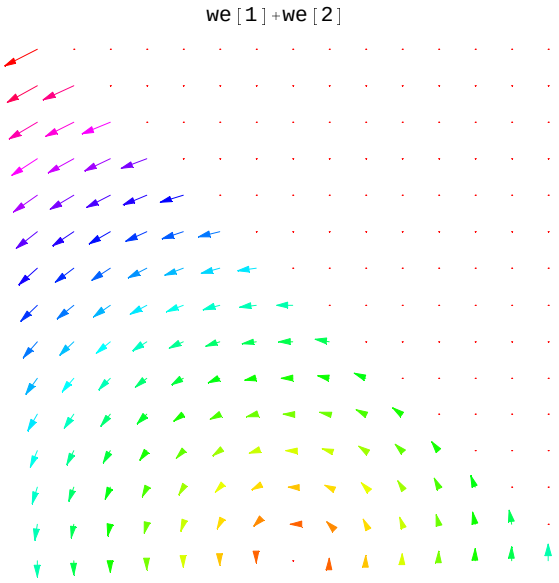
we[3]-we[1]



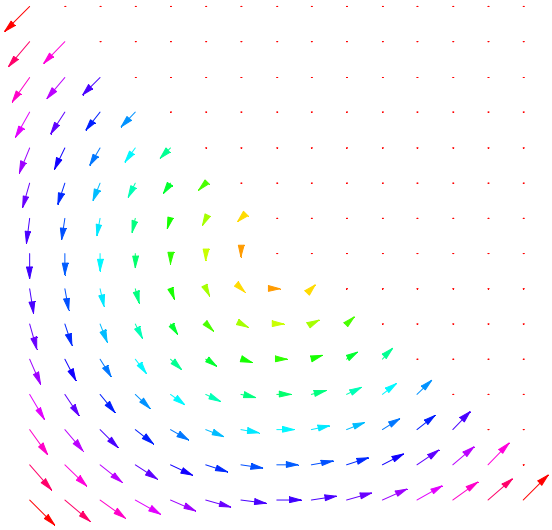
Out[62]= - Graphics -

In[66]:=
```
PlotVectorField[we[1, x, y] + we[2, x, y], {x, 0, 1},
  {y, 0, 1}, ColorFunction → Hue, PlotLabel → "we[1]+we[2]"];
PlotVectorField[we[2, x, y] + we[3, x, y], {x, 0, 1}, {y, 0, 1},
  ColorFunction → Hue, PlotLabel → "we[2]+we[3]"];
PlotVectorField[we[3, x, y] + we[1, x, y], {x, 0, 1}, {y, 0, 1},
  ColorFunction → Hue, PlotLabel → "we[3]+we[1]"];
```

we[1]+we[2]



we[2]+we[3]



we[3]+we[1]