Bezierfläche

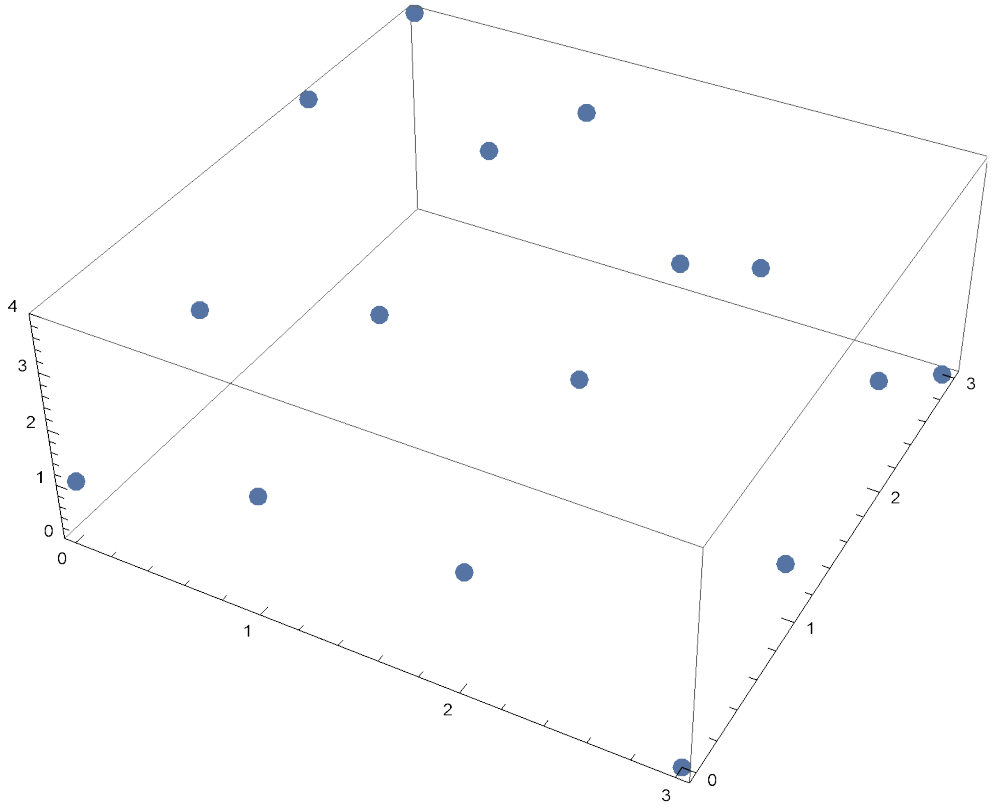
Buch:Höhere Mathematik sehen und verstehen, Haftendorn, Riebesehl, Dammer, Springer Spektrum, Feb. 2021

Datei BezierFlaechen.nb zu Abschnitt 5.3.4 Seite 373, Abb. 5.19

```
In[•]:= P[x_, y_] := {x, y, Z[[x + 1, y + 1]]};

In[•]:= Z = {{1, 2, 4, 4}, {2, 3, 4, 3}, {2, 3, 3, 1}, {0, 1, 2, 0}};

In[•]:= P[2, 2]
Out[•]= {2, 2, 3}

In[•]:= f[s_, t_] := Sum[P[i, j] * B[i, s/3] * B[j, t/3], {i, 0, 3}, {j, 0, 3}]

In[•]:= B[0, t_] := (1 - t)^3

In[•]:= B[1, t_] := 3 t (1 - t)^2

In[•]:= B[2, t_] := 3 (1 - t) t^2

In[•]:= B[3, t_] := t^3

In[•]:= f[s, t] // Expand
Out[•]= {s, t, 1 + s - s^2/3 - s^3/27 + t + t^2/3 - s t^2/3 + 2 s^3 t^2/81 - t^3/9 + s t^3/27 - s^3 t^3/243}

In[•]:= f[3, 0]
Out[•]= {3, 0, 0}

In[•]:= f[3/2, t] // Expand
Out[•]= {3/2, t, 13/8 + t - t^2/12 - 5 t^3/72}
```

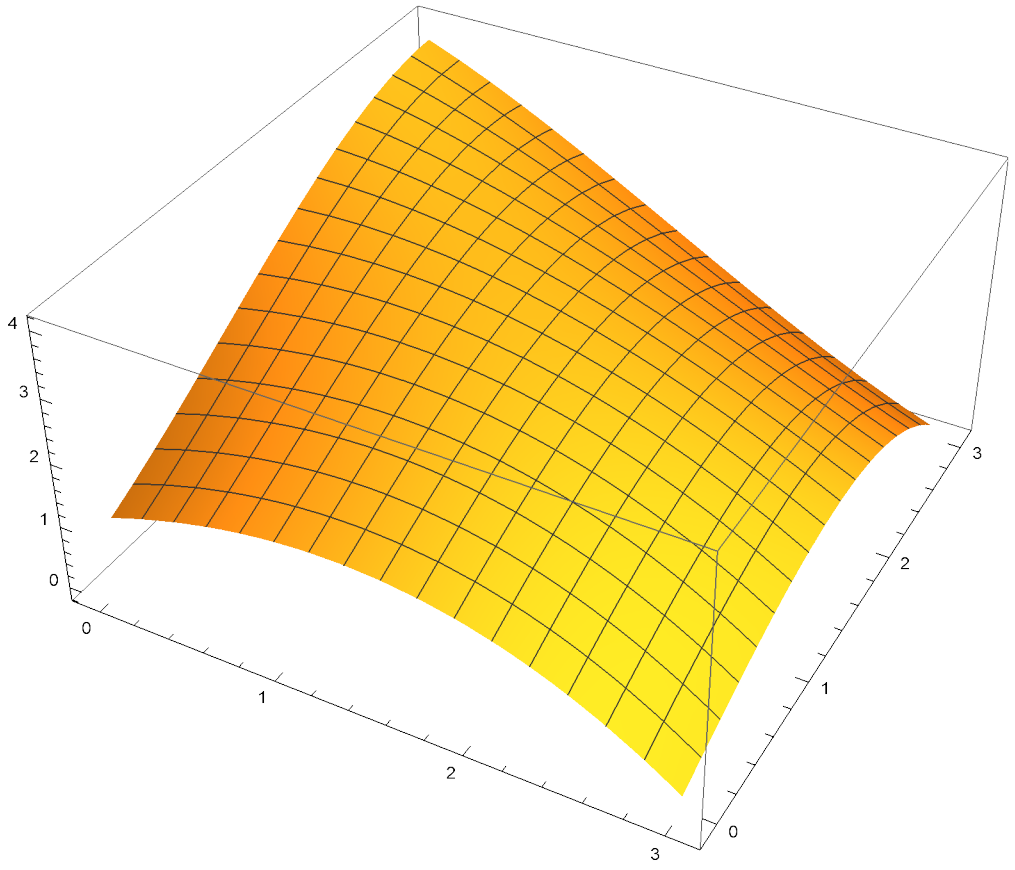
In[•]:=
```
pts = ListPointPlot3D[
  Flatten[Table[P[s, t], {s, 0, 3}, {t, 0, 3}], 1], PlotStyle → PointSize[0.02]]
```

Out[•]=



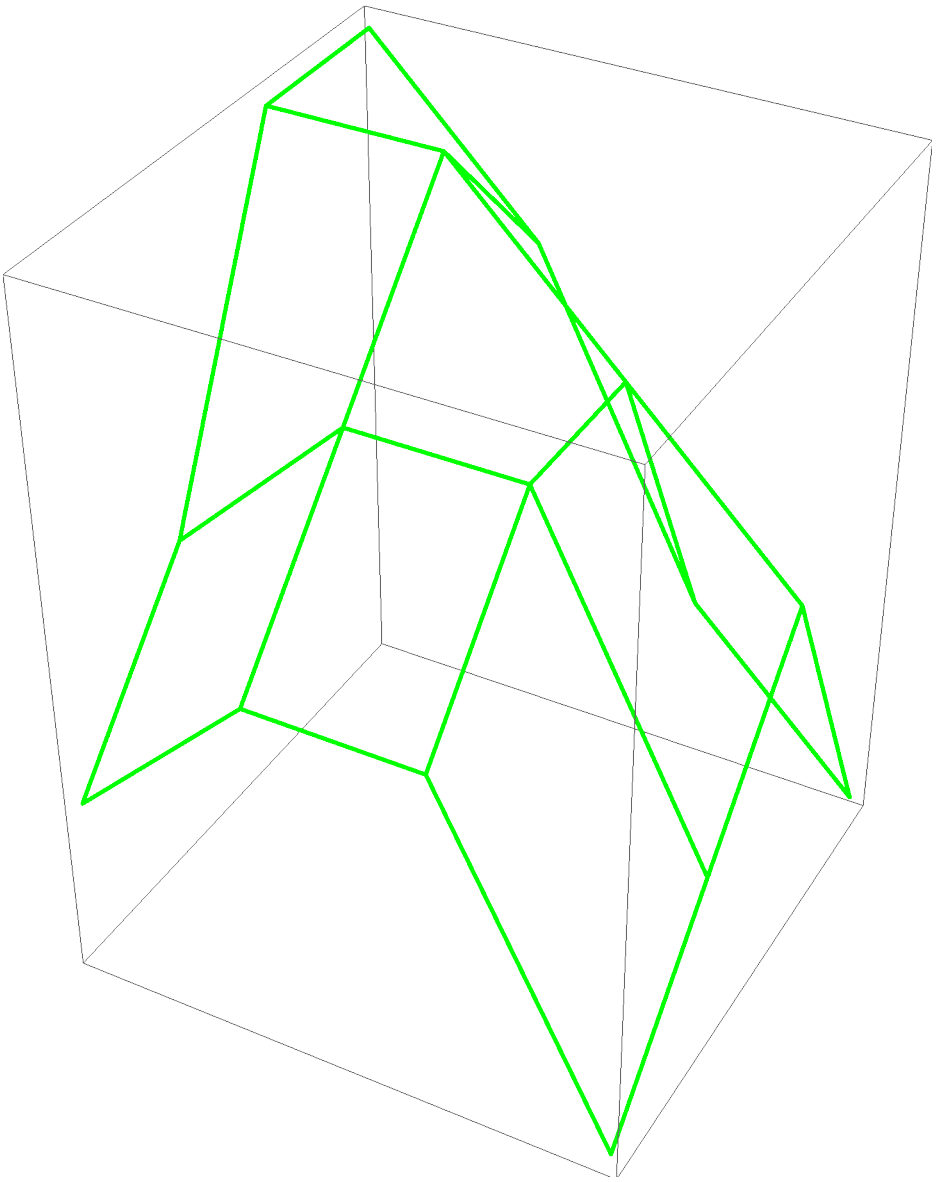
In[•]:=
```
fl = ParametricPlot3D[f[s, t], {s, 0, 3}, {t, 0, 3}, BoxRatios → {1, 1, 0.5}]
```

Out[•]=



In[ ]:=
```
netz = Graphics3D[{Thickness[0.005], Green,
    Line[{P[0, 0], P[0, 1], P[0, 2], P[0, 3], P[1, 3], P[1, 2], P[1, 1], P[1, 0],
      P[2, 0], P[2, 1], P[2, 2], P[2, 3],
      P[3, 3], P[3, 2], P[3, 1], P[3, 0],
      P[2, 0], P[1, 0], P[0, 0],
      P[0, 1], P[1, 1], P[2, 1], P[3, 1],
      P[3, 2], P[2, 2], P[1, 2], P[0, 2],
      P[0, 3], P[1, 3], P[2, 3]}]}]
```

Out[ ]=



In[•]:= **Show[fl, pts, netz, PlotRange → {Automatic, Automatic}]**

Out[•]=