Lecture examples

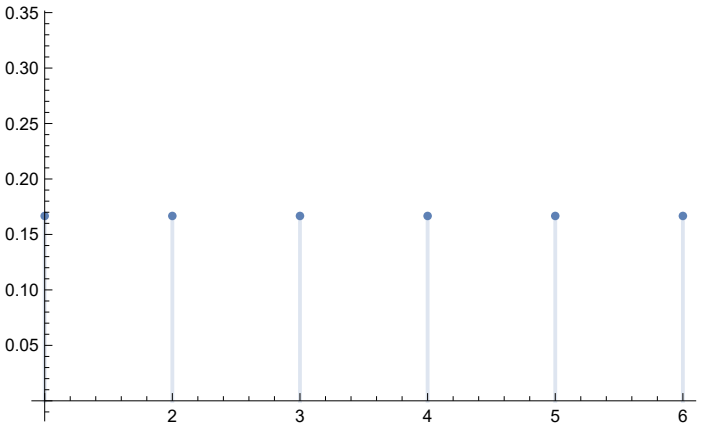
In[•]:=
```
PDF[DiscreteUniformDistribution[{1, 6}], x]
```

Out[•]=

$$\begin{cases} \frac{1}{6} & 1 \le x \le 6 \\ 0 & \text{True} \end{cases}$$

In[•]:=
```
DiscretePlot[PDF[DiscreteUniformDistribution[{1, 6}], x], {x, 1, 6}]
```

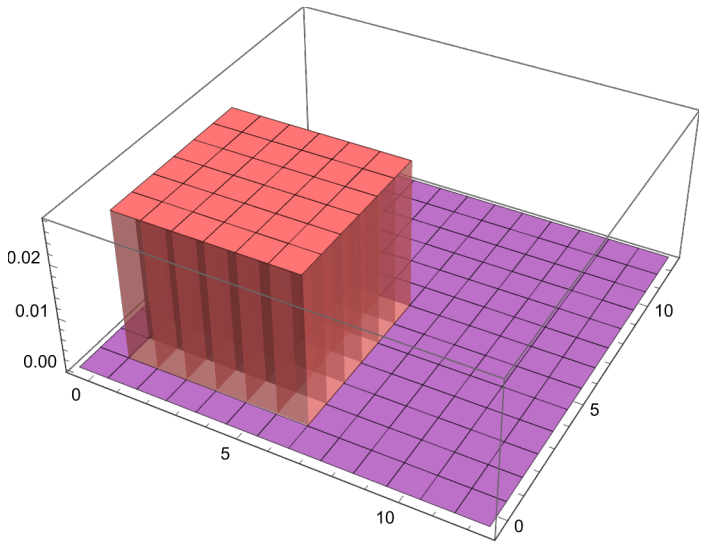
Out[•]=



In[•]:=
```
𝒟 = ProductDistribution[{DiscreteUniformDistribution[{1, 6}], 2}];
```

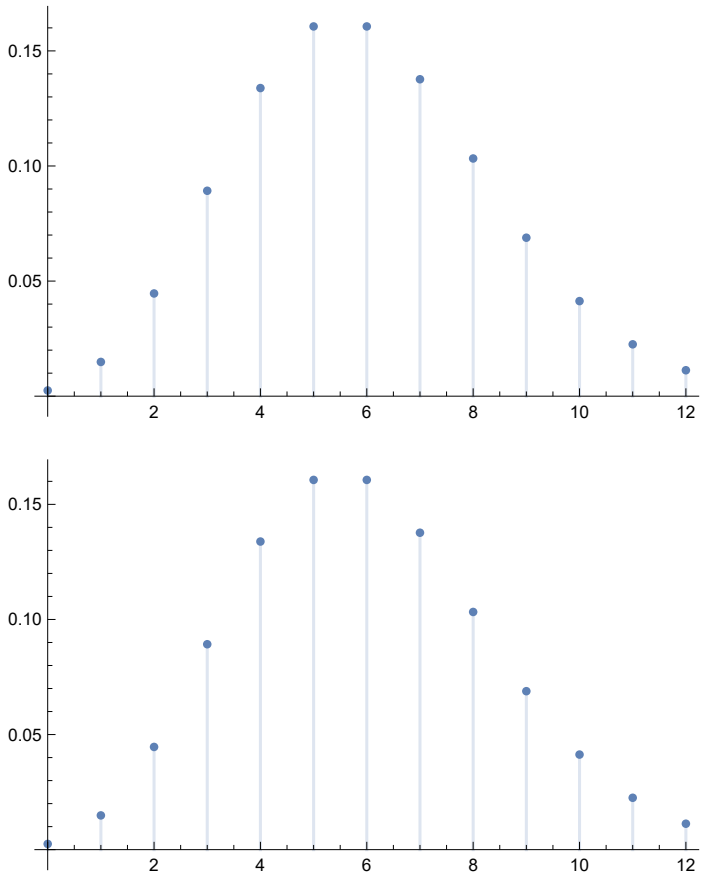
In[•]:=
```
DiscretePlot3D[PDF[𝒟, {x, y}], {x, 0, 12},
 {y, 0, 12}, ExtentSize → Full, ColorFunction → "Rainbow"]
```

Out[•]=



In[•]:=
```
DiscretePlot[PDF[PoissonDistribution[6], x], {x, 0, 12}]
```

In[•]:=

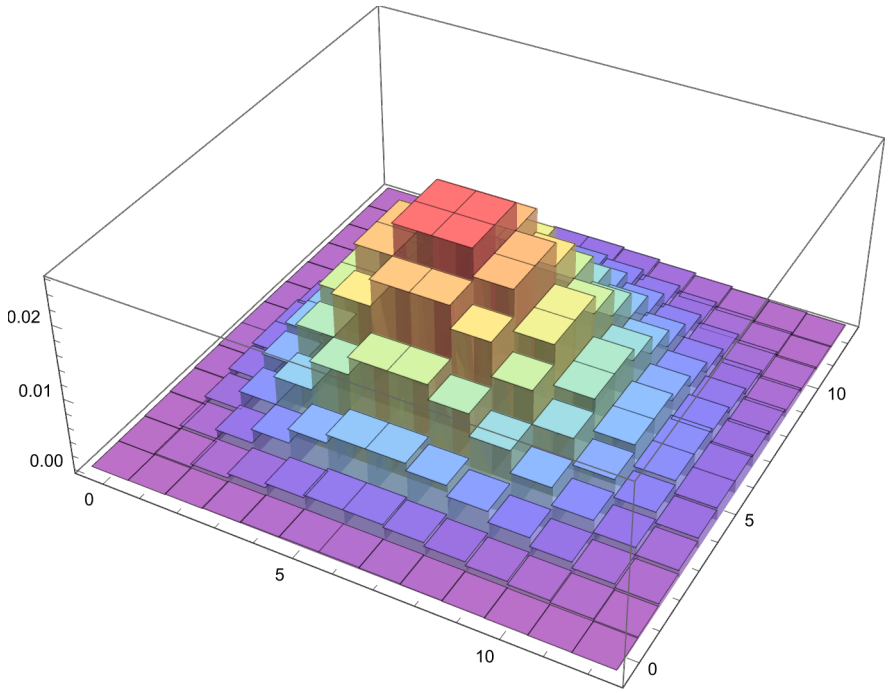


Out[•]=

In[•]:=
```
ℬ = ProductDistribution[{PoissonDistribution[6], 2}];
```

In[•]:=
```
DiscretePlot3D[PDF[ℬ, {x, y}], {x, 0, 12},
 {y, 0, 12}, ExtentSize → Full, ColorFunction → "Rainbow"]
```

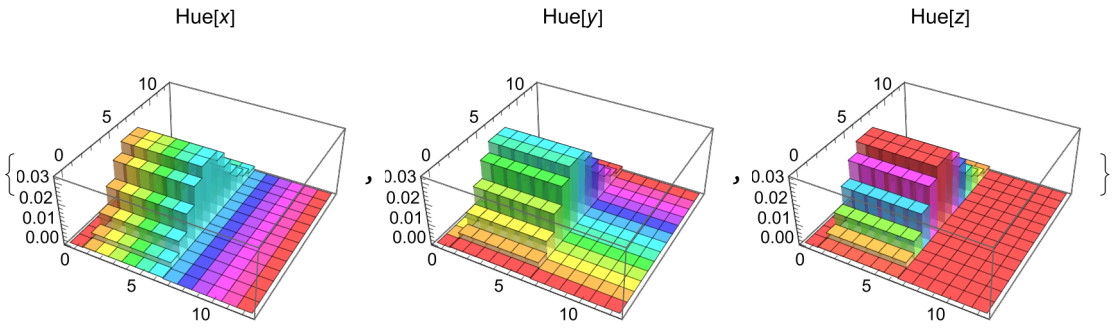
Out[•]=



In[•]:=
```
𝒢 = ProductDistribution[UniformDistribution[{1, 6}], PoissonDistribution[6]];
```

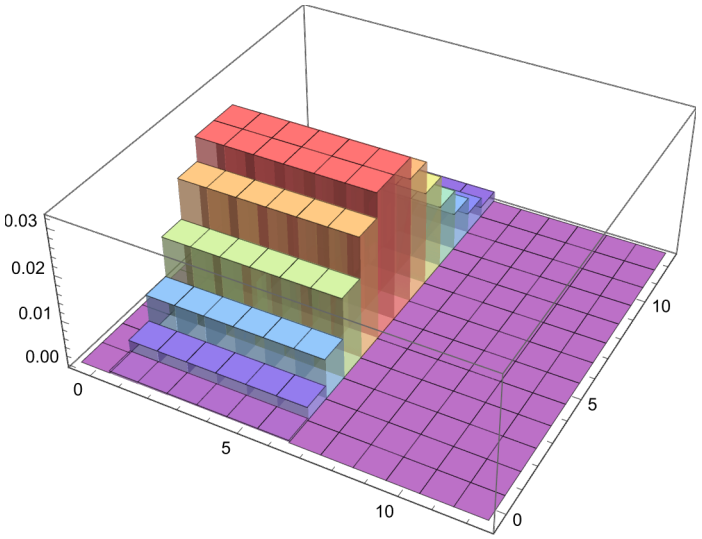
```
In[•]:= Map[DiscretePlot3D[PDF[𝒢, {x, y}], {x, 0, 12}, {y, 0, 12}, ExtentSize → Full,
    ColorFunction → Function[{x, y, z}, #], PlotLabel → #] &, {Hue[x], Hue[y], Hue[z]}]
```

Out[•]=




```
In[•]:= DiscretePlot3D[PDF[𝒢, {x, y}], {x, 0, 12},
    {y, 0, 12}, ExtentSize → Full, ColorFunction → "Rainbow"]
```

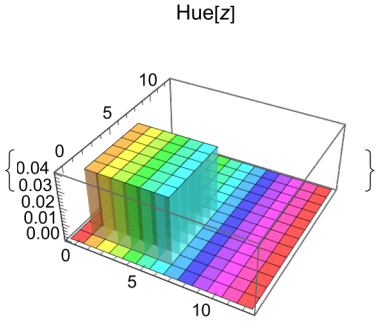
Out[•]=



Mathematica examples

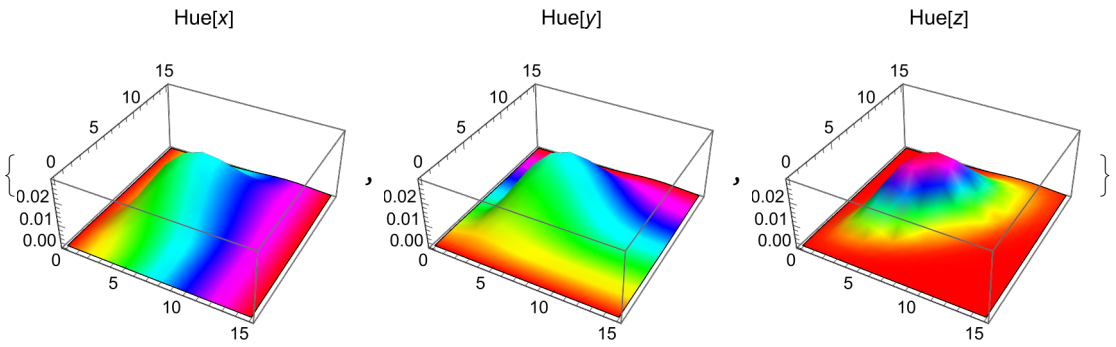
```
In[•]:= Map[DiscretePlot3D[PDF[𝒟, {x, y}], {x, 0, 12}, {y, 0, 12}, ExtentSize → Full,
    ColorFunction → Function[{z}, #], PlotLabel → #] &, {Hue[z]}]
```

Out[•]=



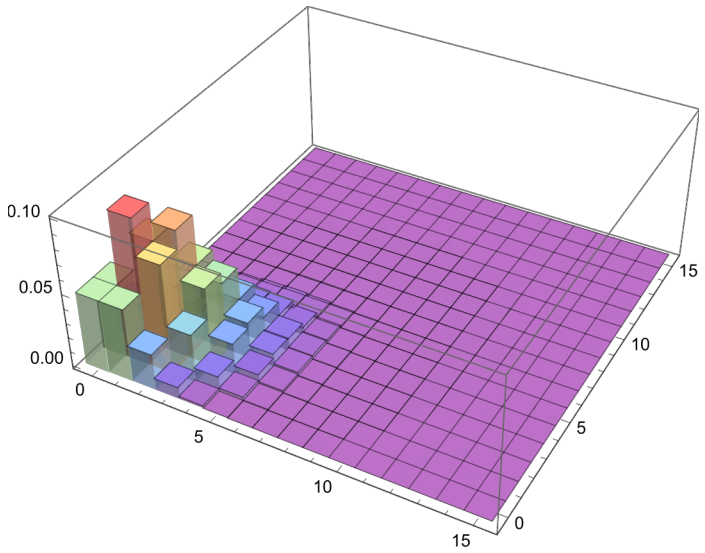
In[•]:=
```
Map[DiscretePlot3D[PDF[MultivariatePoissonDistribution[5, {2, 3}], {x, y}],
    {x, 0, 15}, {y, 0, 15}, Joined → True, PlotRange → All,
    ColorFunction → Function[{x, y, z}, #], PlotLabel → #] &, {Hue[x], Hue[y], Hue[z]}]
```

Out[•]=



In[•]:=
```
DiscretePlot3D[PDF[MultivariatePoissonDistribution[1, {1, 1}], {x, y}],
  {x, 0, 15}, {y, 0, 15}, ExtentSize → Full, ColorFunction → "Rainbow"]
```

Out[•]=

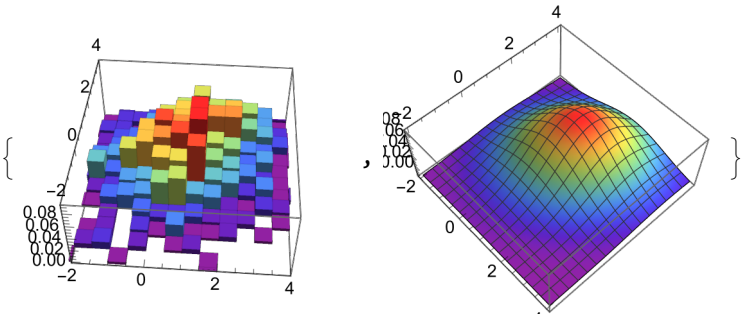


Multivariate Normal Distribution

In[•]:=
```
data = RandomVariate[d = MultinormalDistribution[{1, 2}, {{2, 1 / 2}, {1 / 2, 2}}], 10^3];
```

```
In[•]:= {Histogram3D[data, 20, "PDF", ColorFunction → "Rainbow",
          PlotRange → {{-2, 4}, {-2, 4}, All}], Plot3D[PDF[d, {x, y}], {x, -2, 4},
          {y, -2, 4}, ColorFunction → "Rainbow", PlotPoints → 35, PlotRange → All]}
```

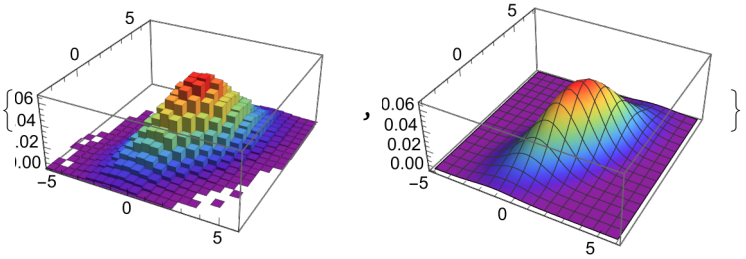
Out[•]=



Bivariate Normal Distribution

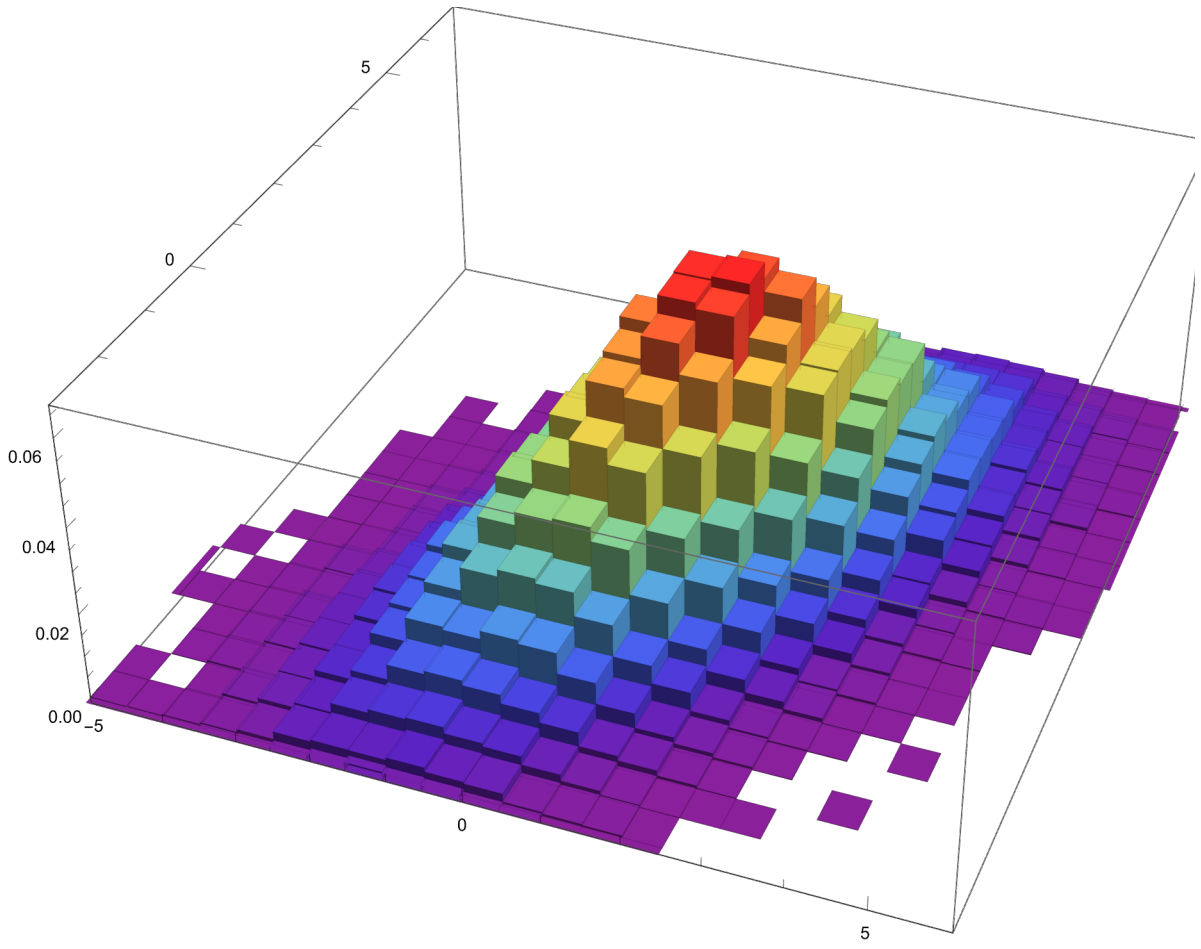
```
In[•]:= sample = RandomVariate[d = BinormalDistribution[{1, 2}, {1.5, 2}, 0.6], 10^5];
        {Histogram3D[sample, 30, "PDF", ColorFunction → "Rainbow",
          PlotRange → {{-5, 6}, {-3, 7}, All}], Plot3D[PDF[d, {x, y}], {x, -5, 6},
          {y, -3, 7}, ColorFunction → "Rainbow", PlotPoints → 35, PlotRange → All]}
```

Out[•]=



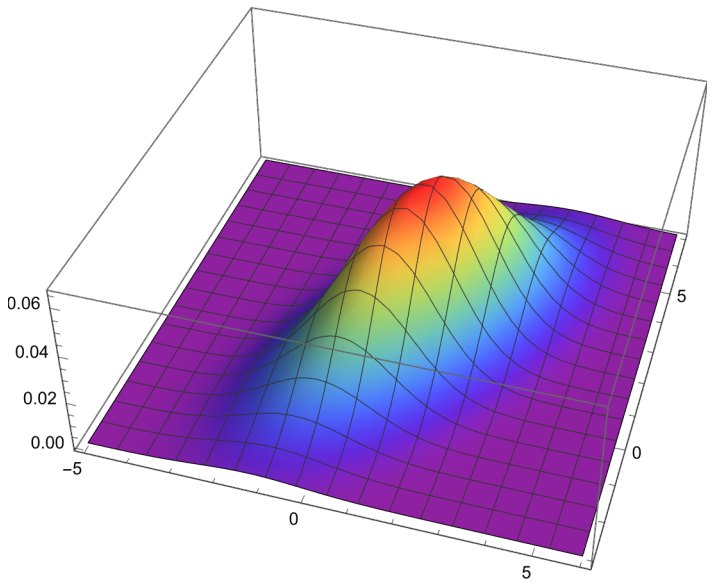
In[•]:=
```
Histogram3D[sample, 30, "PDF",
 ColorFunction → "Rainbow", PlotRange → {{-5, 6}, {-3, 7}, All}]
```

Out[•]=



In[•]:=
```
Plot3D[PDF[d, {x, y}], {x, -5, 6}, {y, -3, 7},
 ColorFunction → "Rainbow", PlotPoints → 35, PlotRange → All]
```

Out[•]=



In[•]:=
```
ContourPlot[PDF[d, {x, y}], {x, -5, 6}, {y, -3, 7}]
```

Out[•]=