

```

In[1]:= DOF = 2
Out[1]= 2

In[2]:= v = RandomVariate[NormalDistribution[0, 1], DOF]
Out[2]= {-0.0158689, 0.728185}

In[3]:= v2 = v.v
Out[3]= 0.530505

In[4]:= DOF = 2; v = RandomVariate[NormalDistribution[0, 1], DOF]; v2 = v.v
Out[4]= 6.88471

In[29]:= DOF = 4; myList = {}; For[i = 1, i ≤ 1000, i++,
  v = RandomVariate[NormalDistribution[0, 1], DOF];
  v2 = v.v;
  AppendTo[myList, v2]
]; Print[myList]

{3.1929, 3.40364, 2.53623, 0.452446, 3.27476, 12.3622, 0.549414, 3.36981, 1.4318, 6.01336,
  1.07478, 1.74167, 4.42528, 1.90404, 3.07994, 12.6745, 2.21182, 5.04016, 3.32996,
  1.58876, 2.74902, 9.00113, 9.60522, 1.22769, 1.90256, 1.28816, 5.86847, 2.06017,
  0.332111, 1.68846, 3.92037, 5.32048, 6.43274, 0.996493, 3.25696, 7.13363, 1.21377,
  10.4264, 2.94329, 1.42576, 0.515888, 5.37143, 5.29303, 1.18103, 3.97853, 5.95084,
  3.87535, 5.84744, 0.584101, 2.07099, 5.72862, 12.4402, 3.19444, 4.57205, 1.56487,
  2.37439, 5.25395, 12.7222, 0.914765, 2.20848, 2.76215, 3.17364, 2.44077, 4.56587,
  4.62972, 3.79305, 4.83283, 2.33501, 2.65774, 2.9015, 4.53073, 6.12914, 0.912403,
  5.87011, 5.81383, 6.19529, 6.83403, 0.258566, 2.28982, 6.20226, 2.18085, 2.07742,
  2.49143, 0.992722, 5.77172, 4.94429, 4.44949, 2.79488, 5.61632, 2.57783, 8.7066,
  6.30955, 1.9782, 1.33245, 3.15057, 5.0991, 1.12037, 3.29928, 1.28775, 1.08612,
  2.67938, 9.29917, 1.35011, 6.58809, 3.62507, 1.59303, 2.0875, 2.14205, 2.35121,
  3.11833, 3.56533, 3.22846, 6.37308, 4.13167, 0.515791, 5.6671, 5.04755, 2.16922,
  4.24495, 2.70723, 1.93339, 0.511378, 9.60553, 4.42974, 9.26074, 2.58827, 5.4432,
  7.50592, 7.48831, 1.22192, 5.342, 0.802983, 4.2213, 3.79128, 1.80384, 1.12591,
  5.4969, 5.70478, 7.08556, 10.7641, 4.9687, 2.19368, 1.3364, 4.26133, 1.20359,
  2.40884, 2.91319, 13.8609, 2.63098, 7.28096, 13.0631, 5.03754, 4.20156, 3.14765,
  3.47712, 7.17792, 2.10047, 0.580144, 9.34042, 1.49306, 2.03308, 4.35643, 3.26321,
  1.805, 5.41094, 4.94238, 7.77297, 2.65701, 0.480135, 2.22796, 5.80636, 7.23786,
  0.744729, 1.17016, 6.54139, 1.25448, 0.971166, 2.26786, 2.30797, 5.15409, 5.68465,
  2.65151, 3.72774, 5.44542, 6.857, 1.56247, 1.32821, 1.54607, 2.12944, 3.31036,
  5.58702, 2.61153, 1.15849, 5.63852, 5.85899, 2.10791, 1.31388, 2.5388, 2.47987,
  11.114, 2.19063, 7.52428, 4.44589, 4.64953, 2.03077, 4.40753, 0.896459, 0.781043,
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  1.48699, 3.48128, 2.88138, 1.60008, 6.46024, 2.21926, 3.72165, 11.8797, 6.10657,
  3.99942, 2.84919, 3.34264, 3.87085, 1.04721, 2.29543, 3.57257, 4.52664, 3.06604,
  5.87447, 11.018, 7.0939, 9.27212, 4.71644, 0.842621, 0.869103, 1.24431, 7.35101,

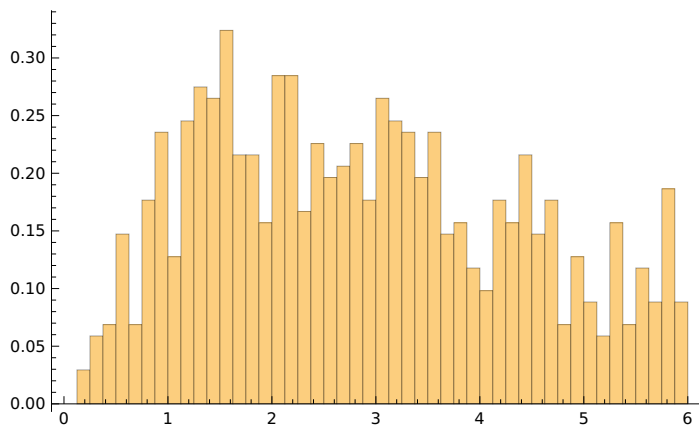
```

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 1.41338, 4.69327, 4.20506, 6.67666, 1.82957, 3.66466, 1.36189, 5.58555, 2.48954,
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 2.46726, 3.57696, 0.7083, 4.41319, 0.321382, 5.77764, 3.87406, 1.14381, 4.50157,
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 4.33143, 6.163, 3.68583, 4.77751, 7.62738, 1.33367, 1.2945, 2.26159, 0.958124,
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 3.65458, 4.22502, 3.28158, 2.16022, 2.13498, 6.94108, 8.0698, 1.32119, 5.20872,
 4.53081, 2.19457, 1.34567, 0.205526, 3.15243, 0.996086, 2.11117, 5.98562, 5.3338,
 6.67261, 6.03345, 1.37448, 9.62008, 3.3031, 1.24322, 3.28891, 4.92523, 9.09446}

```
ln[30]:= h1 = Histogram[myList, {0, 6, 0.125}, "PDF"]
```

Out[30]=

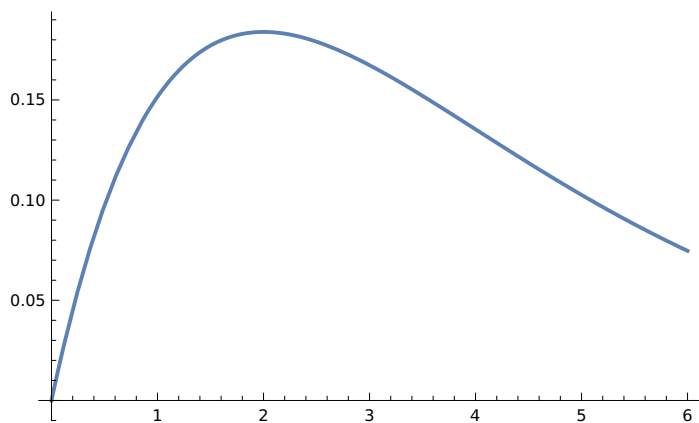
In[31]:= **PDF[ChiSquareDistribution[DOF], x]**

Out[31]=

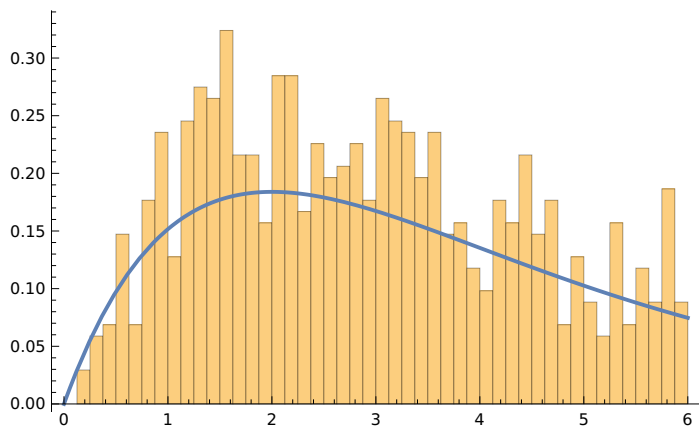
$$\begin{cases} \frac{1}{4} e^{-x/2} x^3 & x > 0 \\ 0 & \text{True} \end{cases}$$

In[32]:= **h2 = Plot[PDF[ChiSquareDistribution[DOF], x], {x, 0, 6}]**

Out[32]=

In[33]:= **Show[h1, h2]**

Out[33]=



```
In[34]:= bc = BinCounts[myList, {0, 6, 0.125}]
```

```
Out[34]=
```

```
{0, 3, 6, 7, 15, 7, 18, 24, 13, 25, 28, 27, 33, 22, 22, 16, 29, 29, 17, 23, 20, 21, 23, 18, 27,
 25, 24, 20, 24, 15, 16, 12, 10, 18, 16, 22, 15, 18, 7, 13, 9, 6, 16, 7, 12, 9, 19, 9}
```

```
In[35]:= bcm = Position[bc, Max[bc]]
```

```
Out[35]=
```

```
{{13}}
```

<https://community.wolfram.com/groups/-/m/t/997236>

Position versus Pick

```
In[36]:= histlist = HistogramList[myList, {0, 6, 0.125}]
```

```
Out[36]=
```

```
{{0., 0.125, 0.25, 0.375, 0.5, 0.625, 0.75, 0.875, 1., 1.125, 1.25, 1.375, 1.5,
 1.625, 1.75, 1.875, 2., 2.125, 2.25, 2.375, 2.5, 2.625, 2.75, 2.875, 3.,
 3.125, 3.25, 3.375, 3.5, 3.625, 3.75, 3.875, 4., 4.125, 4.25, 4.375, 4.5,
 4.625, 4.75, 4.875, 5., 5.125, 5.25, 5.375, 5.5, 5.625, 5.75, 5.875, 6.},
 {0, 3, 6, 7, 15, 7, 18, 24, 13, 25, 28, 27, 33, 22, 22, 16, 29, 29, 17, 23, 20, 21, 23, 18,
 27, 25, 24, 20, 24, 15, 16, 12, 10, 18, 16, 22, 15, 18, 7, 13, 9, 6, 16, 7, 12, 9, 19, 9}}
```

```
In[37]:= histlist[[1]]
```

```
Out[37]=
```

```
{0., 0.125, 0.25, 0.375, 0.5, 0.625, 0.75, 0.875, 1., 1.125, 1.25, 1.375,
 1.5, 1.625, 1.75, 1.875, 2., 2.125, 2.25, 2.375, 2.5, 2.625, 2.75, 2.875,
 3., 3.125, 3.25, 3.375, 3.5, 3.625, 3.75, 3.875, 4., 4.125, 4.25, 4.375,
 4.5, 4.625, 4.75, 4.875, 5., 5.125, 5.25, 5.375, 5.5, 5.625, 5.75, 5.875, 6.}
```

```
In[38]:= histlist[[2]]
```

```
Out[38]=
```

```
{0, 3, 6, 7, 15, 7, 18, 24, 13, 25, 28, 27, 33, 22, 22, 16, 29, 29, 17, 23, 20, 21, 23, 18, 27,
 25, 24, 20, 24, 15, 16, 12, 10, 18, 16, 22, 15, 18, 7, 13, 9, 6, 16, 7, 12, 9, 19, 9}
```

```
In[39]:= maxPos = Position[histlist[[2]], Max[histlist[[2]]][[1]][[1]]
```

```
Out[39]=
```

```
13
```

```
In[40]:= histlist[[1]][[maxPos]]
```

```
Out[40]=
```

```
1.5
```