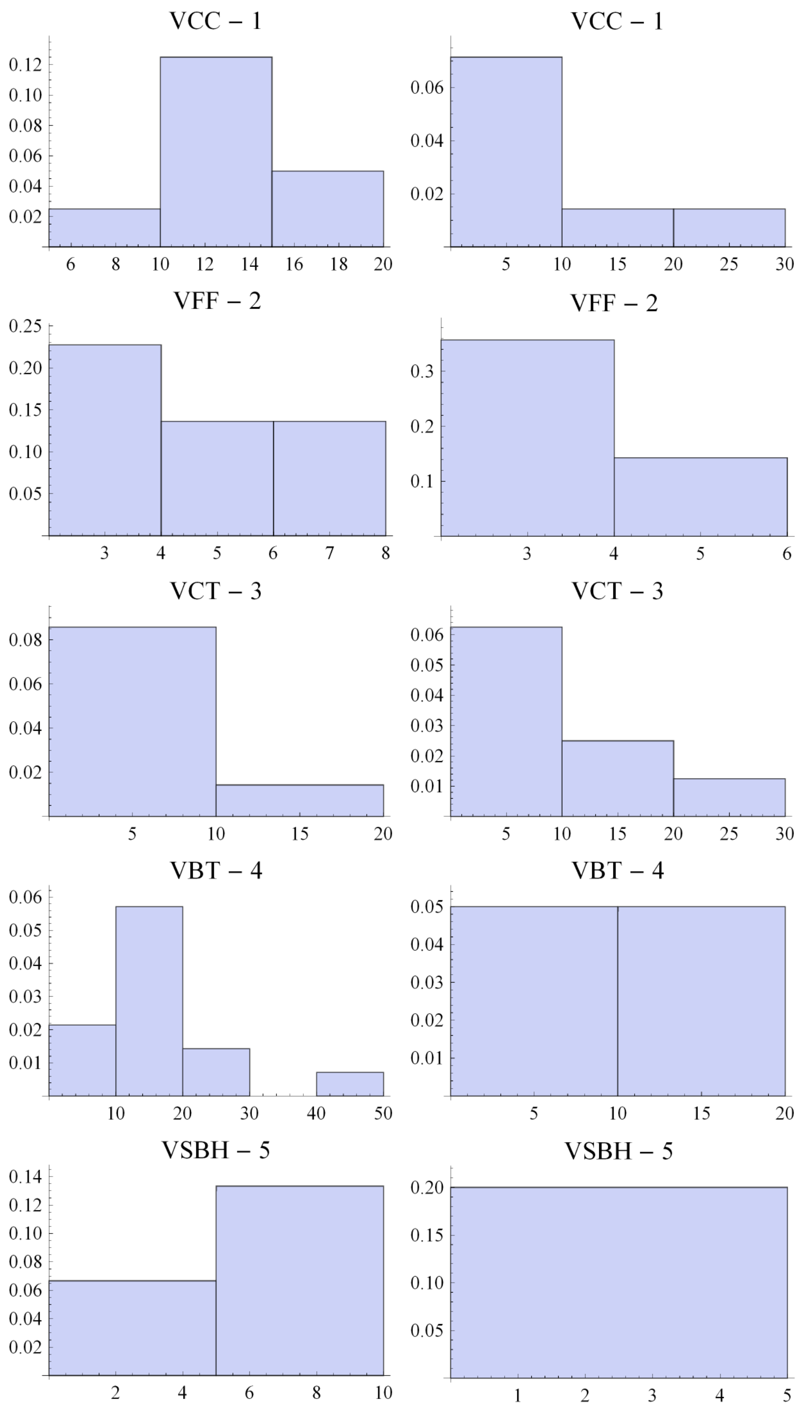
# Goodness of Fit Test

```
data = Import["E:\\2011-2012 ~ UIUC\\SPRING 2012\\CEE
    512 - Logistics Systems Analysis\\Project\\Demand2.xls"]

Out[8]= {{{0., 6., 0., 20., 0.}, {0., 0., 4., 0., 8.}, {17., 6., 0., 0., 4.},
   {0., 4., 0., 40., 8.}, {16., 0., 0., 12., 0.}, {12., 4., 4., 12., 0.},
   {0., 2., 8., 12., 0.}, {12., 2., 4., 16., 0.}, {12., 6., 0., 4., 0.},
   {0., 4., 0., 12., 0.}, {0., 0., 0., 16., 0.}, {0., 2., 16., 24., 0.},
   {12., 0., 0., 12., 0.}, {0., 0., 0., 0., 0.}, {12., 2., 0., 4., 0.},
   {8., 2., 4., 12., 0.}, {0., 0., 4., 8., 0.}, {0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0.},
   {0., 0., 0., 16., 0.}, {4., 2., 4., 16., 0.}, {0., 4., 4., 4., 4.},
   {0., 2., 0., 8., 0.}, {8., 0., 0., 16., 0.}, {16., 2., 4., 8., 0.},
   {8., 0., 8., 0., 0.}, {8., 2., 12., 0., 0.}, {20., 0., 20., 0., 0.},
   {0., 0., 0., 0., 0.}, {8., 2., 8., 0., 0.}, {0., 0., 12., 0., 0.},
   {0., 4., 0., 0., 0.}, {0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0.}}, {{}}, {{}}}

In[10]:= data = data[[1]]

Out[10]= {{0., 6., 0., 20., 0.}, {0., 0., 4., 0., 8.}, {17., 6., 0., 0., 4.},
  {0., 4., 0., 40., 8.}, {16., 0., 0., 12., 0.}, {12., 4., 4., 12., 0.},
  {0., 2., 8., 12., 0.}, {12., 2., 4., 16., 0.}, {12., 6., 0., 4., 0.},
  {0., 4., 0., 12., 0.}, {0., 0., 0., 16., 0.}, {0., 2., 16., 24., 0.},
  {12., 0., 0., 12., 0.}, {0., 0., 0., 0., 0.}, {12., 2., 0., 4., 0.},
  {8., 2., 4., 12., 0.}, {0., 0., 4., 8., 0.}, {0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0.}, {0., 0., 0., 16., 0.}, {4., 2., 4., 16., 0.},
  {0., 4., 4., 4., 4.}, {0., 2., 0., 8., 0.}, {8., 0., 0., 16., 0.},
  {16., 2., 4., 8., 0.}, {8., 0., 8., 0., 0.}, {8., 2., 12., 0., 0.},
  {20., 0., 20., 0., 0.}, {0., 0., 0., 0., 0.}, {8., 2., 8., 0., 0.},
  {0., 0., 12., 0., 0.}, {0., 4., 0., 0., 0.}, {0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0.}}

In[11]:= Length[data]

Out[11]= 36

labels = {"VCC - 1", "VFF - 2", "VCT - 3", "VBT - 4", "VSBH - 5"};

In[30]:= demand = Table[Select[data[[ ;; , i]], (# ≠ 0 &)], {i, 5}] // Round;

In[31]:= demandFall = Table[Select[data[[1 ;; 17, i]], (# ≠ 0 &)], {i, 5}] // Round;

In[32]:= demandSpring = Table[Select[data[[18 ;; 36, i]], (# ≠ 0 &)], {i, 5}] // Round;
```

In[29]:=
```
Table[{Histogram[demandFall[[i]], Automatic, "PDF", PlotLabel → labels[[i]]],
   Histogram[demandSpring[[i]], Automatic, "PDF", PlotLabel → labels[[i]]]},
  {i, 5}] // Grid
```

Out[29]=




In[52]:=
```
hist = Table[Histogram[demand[[i]], 100, "PDF", PlotLabel → labels[[i]]], {i, 5}];
```

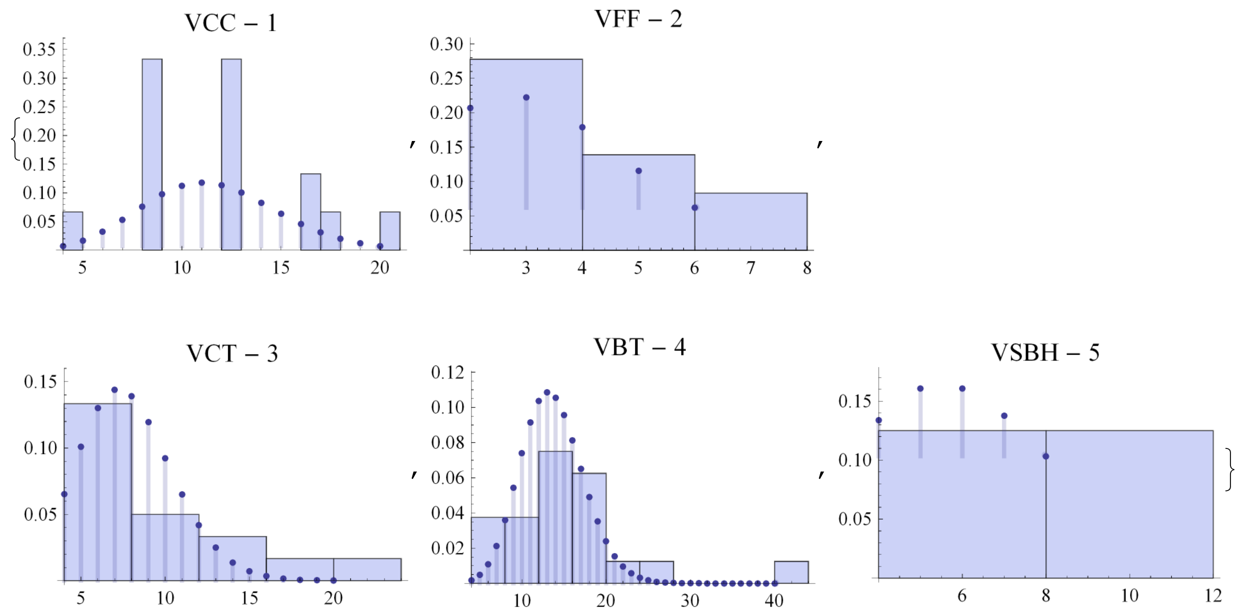
In[38]:=
```
poissondist =
  Table[EstimatedDistribution[demand[[i]], PoissonDistribution[μ]], {i, 5}]
```

Out[38]=
```
{PoissonDistribution[11.5333], PoissonDistribution[3.22222],
 PoissonDistribution[7.73333], PoissonDistribution[13.6], PoissonDistribution[6.]}
```

In[43]:=
```
discretePlot = Table[
   DiscretePlot[PDF[poissondist[[i]], x], {x, Min[demand[[i]]], Max[demand[[i]]]},
    PlotRange → All, FillingStyle → Thick], {i, 5}];
```

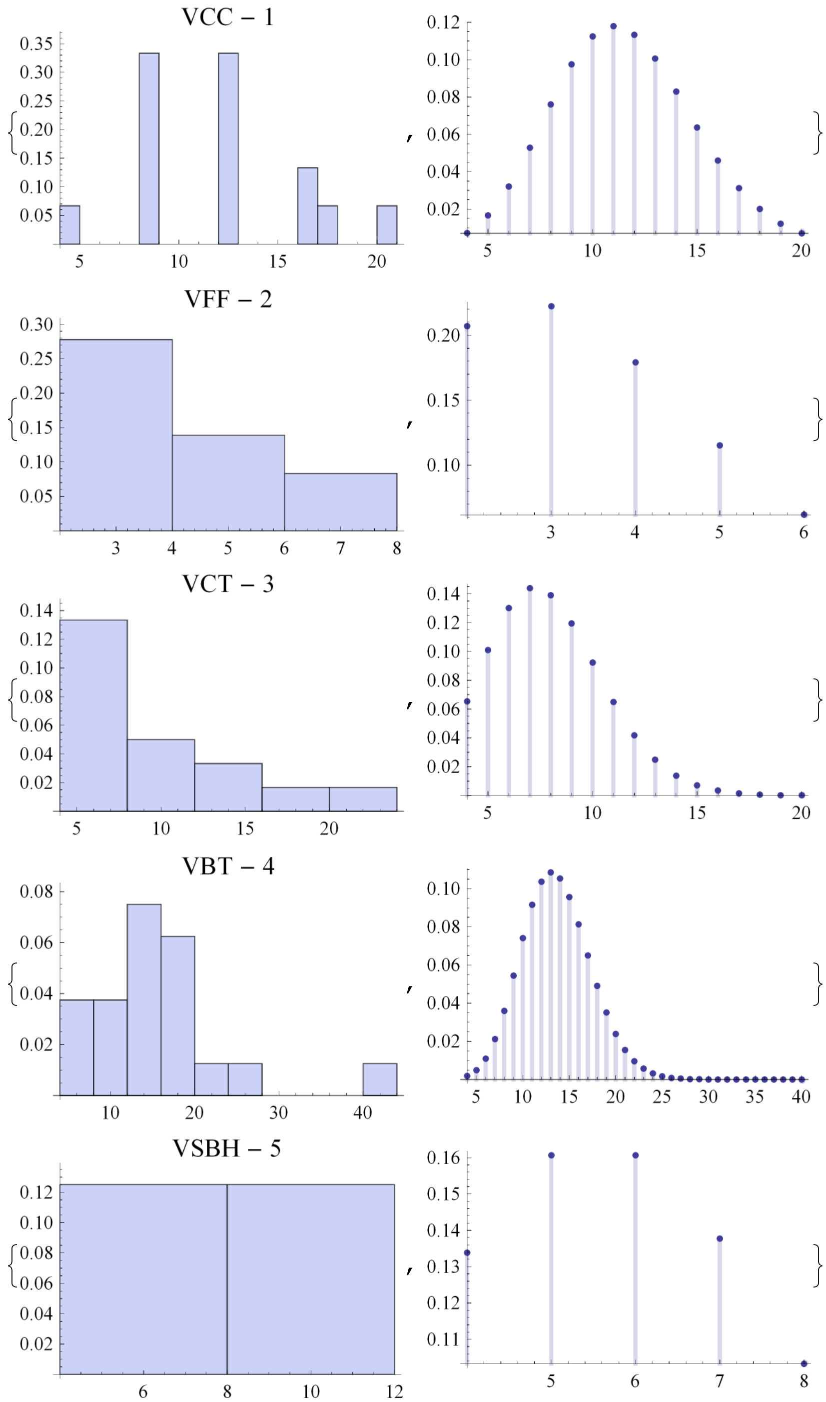
In[53]:=
```
Table[Show[hist[[i]], discretePlot[[i]]], {i, 5}]
```

Out[53]=



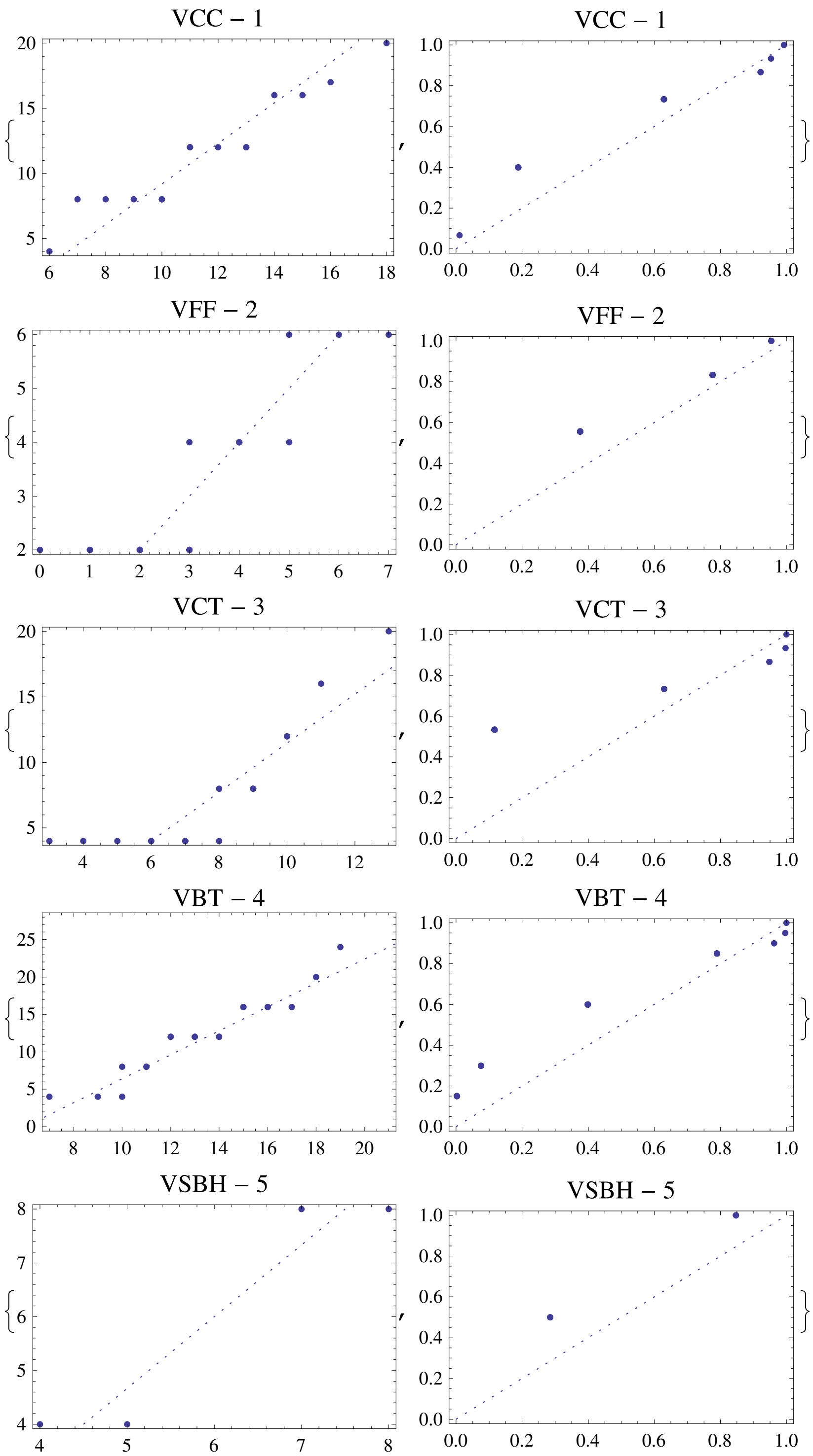
In[58]:=
```
Table[{hist[[i]], discretePlot[[i]]}, {i, 5}] // Column
```

Out[58]=



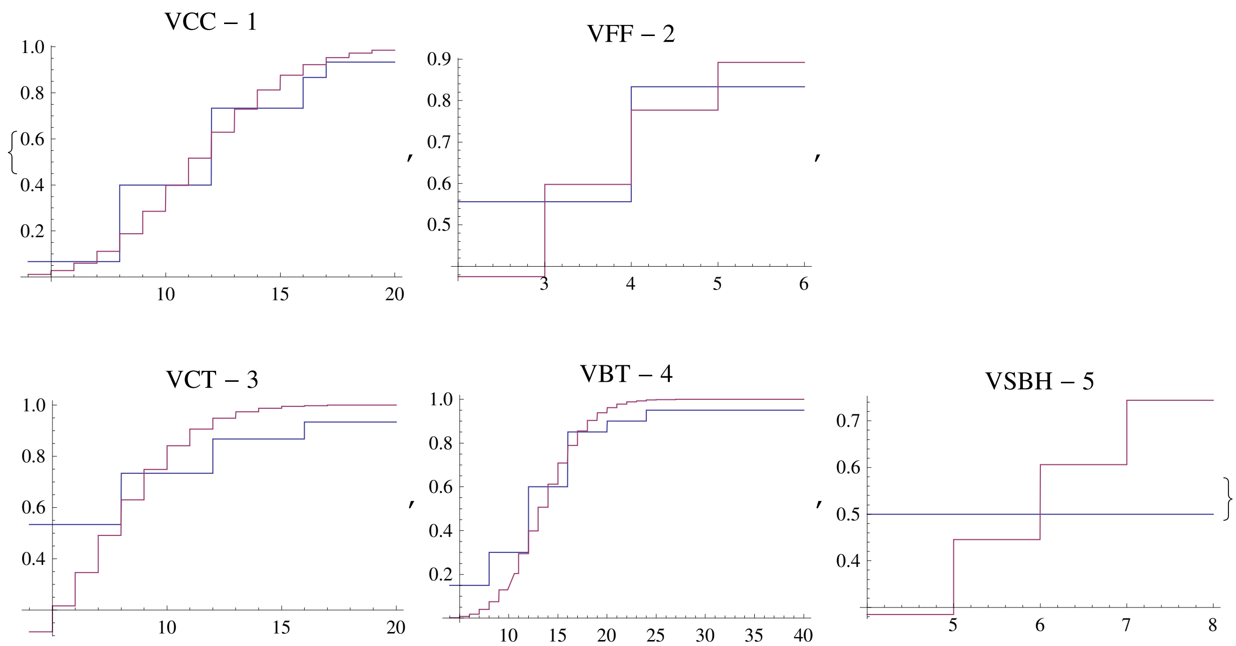
In[56]:=
```
Table[{QuantilePlot[demand[[i]], poissondist[[i]], PlotLabel → labels[[i]]],
   ProbabilityPlot[demand[[i]], poissondist[[i]],
    PlotLabel → labels[[i]]]}, {i, 5}] // Column
```

Out[56]=



In[65]:=
```
Table[Plot[{CDF[EmpiricalDistribution[demand[[i]]], x], CDF[poissondist[[i]], x]},
   {x, Min[demand[[i]]], Max[demand[[i]]]},
   Exclusions → None, PlotLabel → labels[[i]]], {i, 5}]
```

Out[65]=




In[60]:=
```
ptest = Table[DistributionFitTest[demand[[i]],
    PoissonDistribution[μ], "HypothesisTestData"], {i, 5}];
```

In[63]:=
```
Table[{labels[[i]], ptest[[i]]["TestDataTable"]}, {i, 5}] // Column
```

Out[63]=

{VCC - 1,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 14.1723 | 0.00676489 |

}

{VFF - 2,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 21.2312 | 0.000284928 |

}

{VCT - 3,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 13.5208 | 0.0089926 |

}

{VBT - 4,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 9.05731 | 0.1068 |

}

{VSBH - 5,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 3.65858 | 0.160528 |

}

In[64]:=
```
Table[{labels[[i]], ptest[[i]]["TestDataTable"],
   ptest[[i]]["TestConclusion"]}, {i, 5}] // Column
```

Out[64]=

{VCC - 1,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 14.1723 | 0.00676489 |

, The null hypothesis that the data is distributed according to the PoissonDistribution[$\mu$] is rejected at the 5. percent level based on the Pearson $\chi^2$ test.}

{VFF - 2,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 21.2312 | 0.000284928 |

, The null hypothesis that the data is distributed according to the PoissonDistribution[$\mu$] is rejected at the 5. percent level based on the Pearson $\chi^2$ test.}

{VCT - 3,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 13.5208 | 0.0089926 |

, The null hypothesis that the data is distributed according to the PoissonDistribution[$\mu$] is rejected at the 5. percent level based on the Pearson $\chi^2$ test.}

{VBT - 4,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 9.05731 | 0.1068 |

, The null hypothesis that the data is distributed according to the PoissonDistribution[$\mu$] is not rejected at the 5. percent level based on the Pearson $\chi^2$ test.}

{VSBH - 5,

| | Statistic | P-Value |
|---|---|---|
| Pearson $\chi^2$ | 3.65858 | 0.160528 |

, The null hypothesis that the data is distributed according to the PoissonDistribution[$\mu$] is not rejected at the 5. percent level based on the Pearson $\chi^2$ test.}

In[66]:=
```
normaldist =
 Table[EstimatedDistribution[demand[[i]], NormalDistribution[μ, σ]], {i, 5}]
```

Out[66]=
```
{NormalDistribution[11.5333, 4.17719],
 NormalDistribution[3.22222, 1.51127], NormalDistribution[7.73333, 4.94593],
 NormalDistribution[13.6, 7.93977], NormalDistribution[6., 2.]}
```

In[67]:=
```
ntest = Table[DistributionFitTest[demand[[i]],
    NormalDistribution[μ, σ], "HypothesisTestData"], {i, 5}];
```

In[68]:=
```
Table[{labels[[i]], ntest[[i]]["TestDataTable"],
   ntest[[i]]["TestConclusion"]}, {i, 5}] // Column
```

Out[68]=

{VCC - 1,

| | Statistic | P-Value |
|---|---|---|
| Watson $U^2$ | 0.109722 | 0.062301 |

, The null hypothesis that the data is distributed according to the NormalDistribution[$\mu$, $\sigma$] is not rejected at the 5. percent level based on the Watson $U^2$ test.}

{VFF - 2,

| | Statistic | P-Value |
|---|---|---|
| Watson $U^2$ | 0.345011 | 0.000434907 |

, The null hypothesis that the data is distributed according to the NormalDistribution[$\mu$, $\sigma$] is rejected at the 5. percent level based on the Watson $U^2$ test.}

{VCT - 3,

| | Statistic | P-Value |
|---|---|---|
| Watson $U^2$ | 0.242079 | 0.000937337 |

, The null hypothesis that the data is distributed according to the NormalDistribution[$\mu$, $\sigma$] is rejected at the 5. percent level based on the Watson $U^2$ test.}

{VBT - 4,

| | Statistic | P-Value |
|---|---|---|
| Watson $U^2$ | 0.138776 | 0.0227025 |

, The null hypothesis that the data is distributed according to the NormalDistribution[$\mu$, $\sigma$] is rejected at the 5. percent level based on the Watson $U^2$ test.}

{VSBH - 5,

| | Statistic | P-Value |
|---|---|---|
| Watson $U^2$ | 0.117551 | 0.0477956 |

, The null hypothesis that the data is distributed according to the NormalDistribution[$\mu$, $\sigma$] is rejected at the 5. percent level based on the Watson $U^2$ test.}