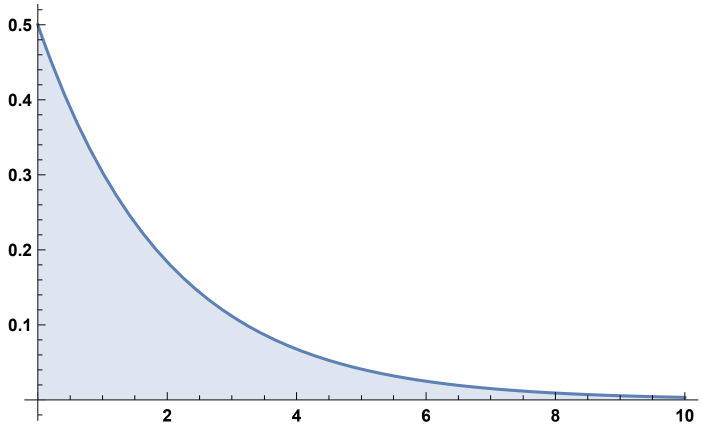
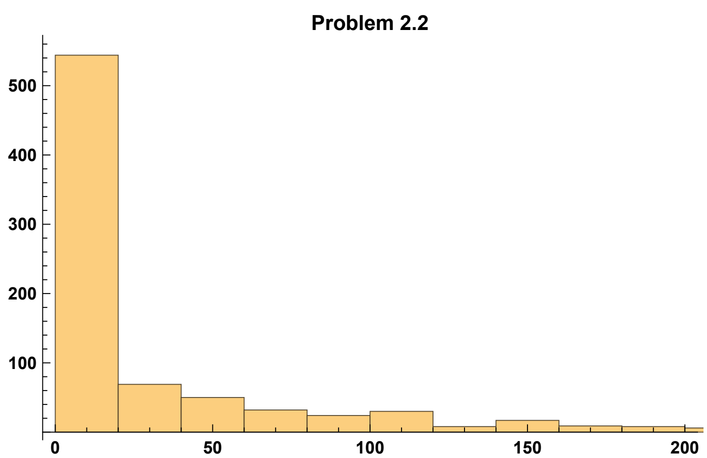
```
In[1]:= critval = InverseCDF[ChiSquareDistribution[2], 0.95]
Out[1]= 5.99146

In[2]:= pval = 1 - CDF[ChiSquareDistribution[2], 6.16]
Out[2]= 0.0459593

In[3]:= Plot[PDF[ChiSquareDistribution[2], x] // Evaluate, {x, 0, 10}, Filling → Axis]
```

Out[3]=




```
In[4]:= quakes = Import[NotebookDirectory[] <> "SimplifiedEarthquakeCatalog2019.txt",
           "Table", "HeaderLines" → 1];
        dates = quakes[[All, 1]];
        times = Differences[dates];

In[7]:= Histogram[times, PlotLabel → "Problem 2.2"]
```

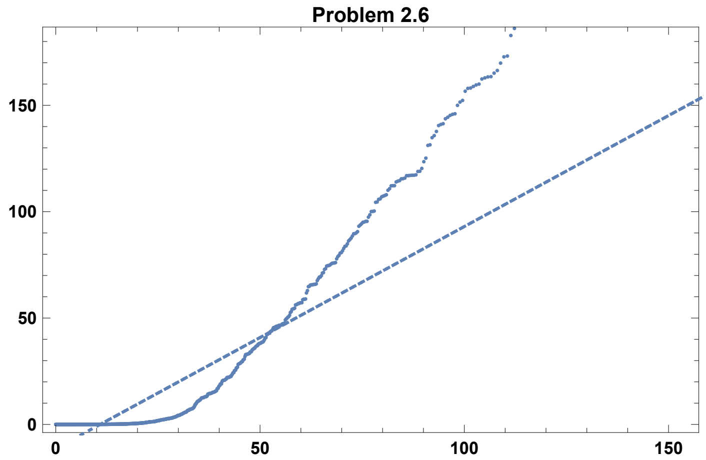
Out[7]=




```
In[8]:= Mean[N[times]]
        StandardDeviation[N[times]]
Out[8]= 37.8646
Out[9]= 75.2639
```

In[10]:=
```
Maximize[{Length[times] * Log[x] - x * Total[times], x ≥ 0}, x]
```
Out[10]=
```
{-3832.33, {x → 0.0264099}}
```

In[11]:=
```
QuantilePlot[times, ExponentialDistribution[0.0264], PlotLabel → "Problem 2.6"]
```
Out[11]=



In[12]:=
```
htd = KolmogorovSmirnovTest[times,
  ExponentialDistribution[0.0264], "HypothesisTestData"]
htd["TestConclusion"]
htd["TestDataTable"]
```

Out[12]= HypothesisTestData[Type: KolmogorovSmirnovTest p–Value: 1.91×10^{-148}]

... **KolmogorovSmirnovTest**: Ties exist in the data and will be ignored for the KolmogorovSmirnov test, which assumes unique values.

... **KolmogorovSmirnovTest**: Ties exist in the data and will be ignored for the KolmogorovSmirnov test, which assumes unique values.

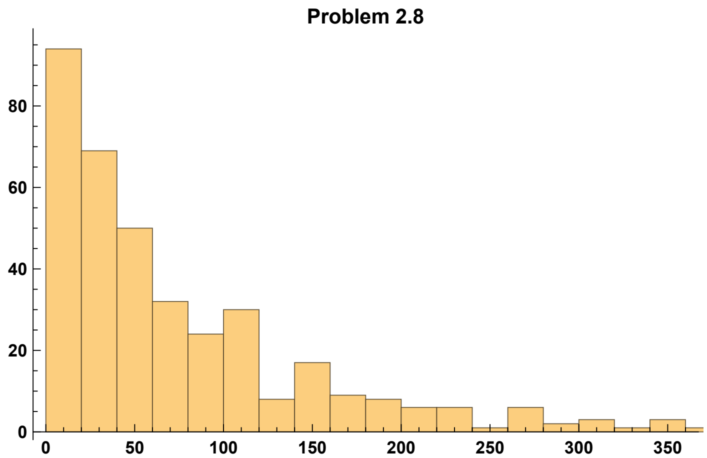
Out[13]= The null hypothesis that
the data is distributed according to the ExponentialDistribution[0.0264]
is rejected at the 5 percent level based on the Kolmogorov-Smirnov test.

... **KolmogorovSmirnovTest**: Ties exist in the data and will be ignored for the KolmogorovSmirnov test, which assumes unique values.

Out[14]=

	Statistic	P-Value
Kolmogorov-Smirnov	0.452369	1.91399×10^{-148}

In[15]:=
```
times2 = Select[times, # > 4 &];
Histogram[times2, PlotLabel → "Problem 2.8"]
Mean[N[times2]]
StandardDeviation[N[times2]]
Maximize[{Length[times2] * Log[x] - x * Total[times2], x ≥ 0}, x]
```

Out[16]=


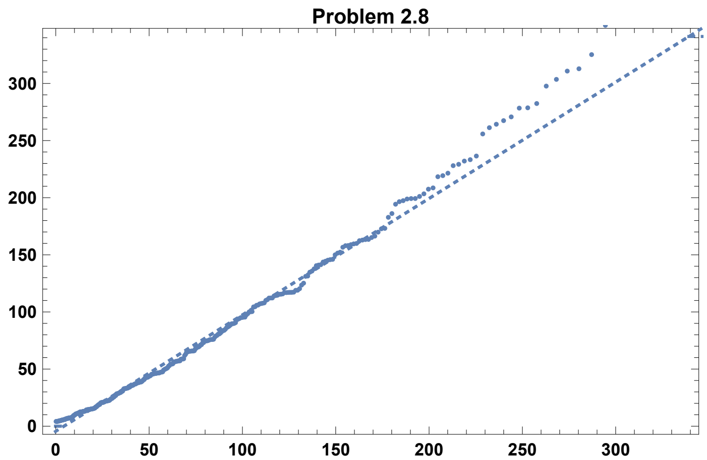
Out[17]= 82.4699

Out[18]= 93.6857

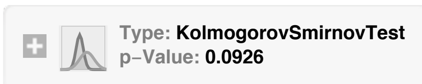
Out[19]= {-2040.49, {x → 0.0121256}}

In[20]:=
```
QuantilePlot[times2, ExponentialDistribution[0.0121], PlotLabel → "Problem 2.8"]
htd = KolmogorovSmirnovTest[times2,
  ExponentialDistribution[0.0121], "HypothesisTestData"]
htd["TestConclusion"]
htd["TestDataTable"]
```

Out[20]=



Out[21]= HypothesisTestData[



]

Out[22]=
```
The null hypothesis that
 the data is distributed according to the ExponentialDistribution[0.0121]
 is not rejected at the 5 percent level based on the Kolmogorov-Smirnov test.
```

Out[23]=

	Statistic	P-Value
Kolmogorov-Smirnov	0.0633837	0.0926099

In[24]:=
```
Integrate[x * 0.0121 * Exp[-0.0121 * x], {x, 0, Infinity}]
```

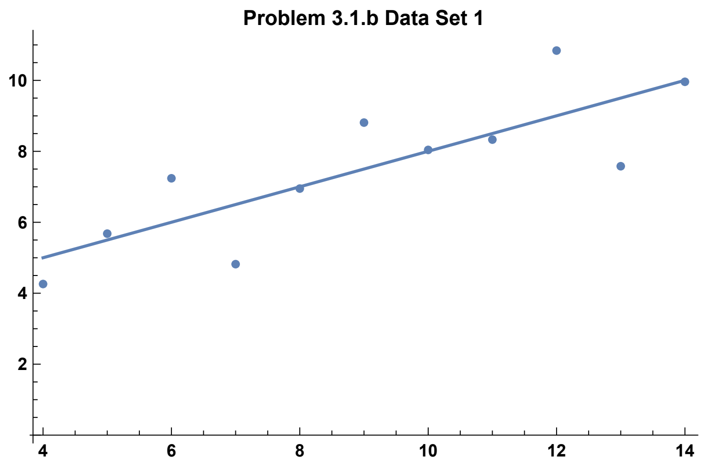
Out[24]= 82.6446

In[25]:=
```
anscombe1 =
  Import[NotebookDirectory[] <> "Anscombe1.txt", "Table", "HeaderLines" → 1];
anscombe2 = Import[NotebookDirectory[] <> "Anscombe2.txt",
   "Table", "HeaderLines" → 1];
anscombe3 = Import[NotebookDirectory[] <> "Anscombe3.txt",
   "Table", "HeaderLines" → 1];
anscombe4 = Import[NotebookDirectory[] <> "Anscombe4.txt",
   "Table", "HeaderLines" → 1];
```

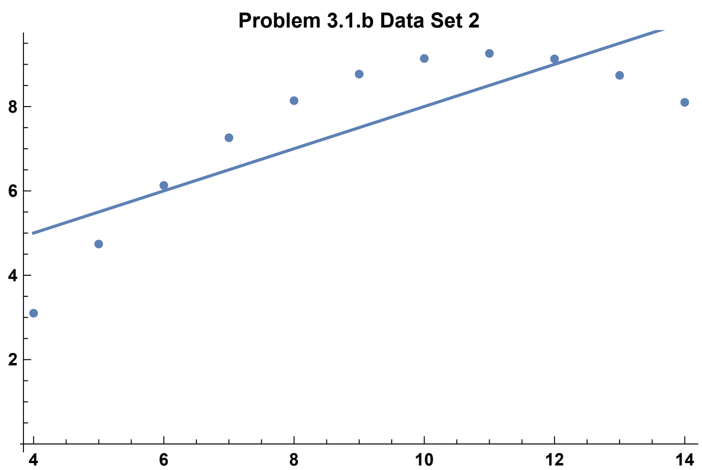
```
In[29]:= Mean[anscombe1]
StandardDeviation[anscombe1]
Mean[anscombe2]
StandardDeviation[anscombe2]
Mean[anscombe3]
StandardDeviation[anscombe3]
Mean[anscombe4]
StandardDeviation[anscombe4]

Out[29]= {9., 7.50091}

Out[30]= {3.31662, 2.03157}

Out[31]= {9., 7.50091}

Out[32]= {3.31662, 2.03166}

Out[33]= {9., 7.5}

Out[34]= {3.31662, 2.03042}

Out[35]= {9., 7.50091}

Out[36]= {3.31662, 2.03058}
```

```
In[37]:= mod1 = LinearModelFit[anscombe1, x, x]
mod2 = LinearModelFit[anscombe2, x, x]
mod3 = LinearModelFit[anscombe3, x, x]
mod4 = LinearModelFit[anscombe4, x, x]
Show[ListPlot[anscombe1, PlotLabel → "Problem 3.1.b Data Set 1"],
 Plot[Normal[mod1], {x, Min[anscombe1[[All, 1]]], Max[anscombe1[[All, 1]]]}]]
Show[ListPlot[anscombe2, PlotLabel → "Problem 3.1.b Data Set 2"],
 Plot[Normal[mod2], {x, Min[anscombe2[[All, 1]]], Max[anscombe2[[All, 1]]]}]]
Show[ListPlot[anscombe3, PlotLabel → "Problem 3.1.b Data Set 3"],
 Plot[Normal[mod3], {x, Min[anscombe3[[All, 1]]], Max[anscombe3[[All, 1]]]}]]
Show[ListPlot[anscombe4, PlotLabel → "Problem 3.1.b Data Set 4"],
 Plot[Normal[mod4], {x, Min[anscombe4[[All, 1]]], Max[anscombe4[[All, 1]]]}]]

Out[37]= FittedModel[ 3.00009 + 0.500091 x ]

Out[38]= FittedModel[ 3.00091 + 0.5 x ]

Out[39]= FittedModel[ 3.00245 + 0.499727 x ]

Out[40]= FittedModel[ 3.00173 + 0.499909 x ]
```

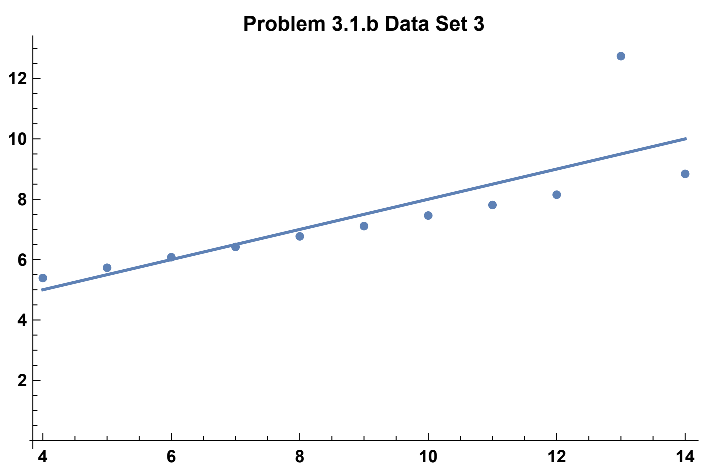
Out[41]=



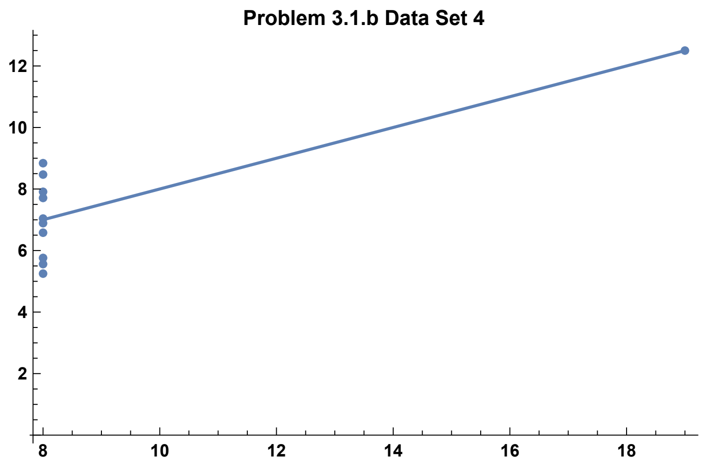
Out[42]=



Out[43]=



Out[44]=



In[98]:=
```
mod1["ParameterTable"]
mod1["RSquared"]
mod1["AdjustedRSquared"]
mod1["ANOVATableFStatistics"]
mod1["ANOVATablePValues"]
e = mod1["FitResiduals"];
ssr = Total[e e]
T = Length[anscombe1];
Sqrt[ssr / (T - 2)]
QuantilePlot[e, PlotLabel → "Problem 3.5 Data Set 1"]
htd = KolmogorovSmirnovTest[e / StandardDeviation[e],
  NormalDistribution[0, 1], "HypothesisTestData"]
htd["TestConclusion"]
htd["TestDataTable"]
```

Out[98]=

	Estimate	Standard Error	t-Statistic	P-Value
1	3.00009	1.12475	2.66735	0.0257341
x	0.500091	0.117906	4.24146	0.00216963

Out[99]= 0.666542

Out[100]= 0.629492

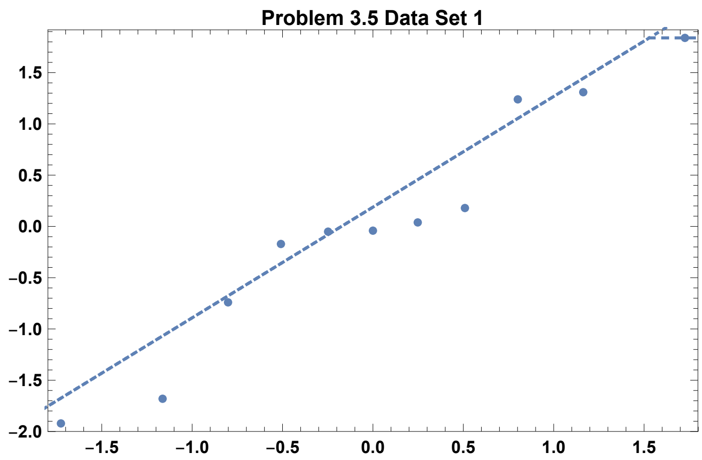
Out[101]= {17.9899}

Out[102]= {0.00216963}

Out[104]= 13.7627

Out[106]= 1.2366

Out[107]=



Out[108]= HypothesisTestData[Type: KolmogorovSmirnovTest p−Value: 0.86]

Out[109]= The null hypothesis that
the data is distributed according to the NormalDistribution[0, 1]
is not rejected at the 5 percent level based on the Kolmogorov-Smirnov test.

Out[110]=

	Statistic	P-Value
Kolmogorov-Smirnov	0.169297	0.859988

In[111]:=
```
mod2["ParameterTable"]
mod2["RSquared"]
mod2["AdjustedRSquared"]
mod2["ANOVATableFStatistics"]
mod2["ANOVATablePValues"]
e = mod2["FitResiduals"];
ssr = Total[e e]
T = Length[anscombe2];
Sqrt[ssr / (T - 2)]
QuantilePlot[e, PlotLabel → "Problem 3.5 Data Set 2"]
htd = KolmogorovSmirnovTest[e / StandardDeviation[e],
  NormalDistribution[0, 1], "HypothesisTestData"]
htd["TestConclusion"]
htd["TestDataTable"]
```

Out[111]=

	Estimate	Standard Error	t-Statistic	P-Value
1	3.00091	1.1253	2.66676	0.0257589
x	0.5	0.117964	4.23859	0.00217882

Out[112]= 0.666242

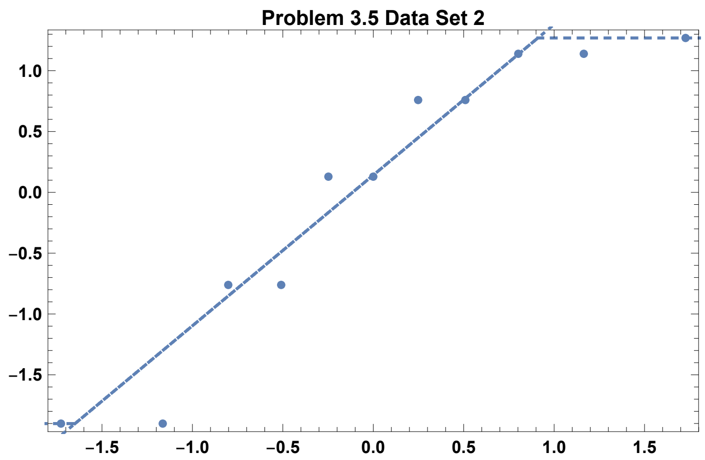
Out[113]= 0.629158

Out[114]= {17.9656}

Out[115]= {0.00217882}

Out[117]= 13.7763

Out[119]= 1.23721

Out[120]=


Out[121]= HypothesisTestData[Type: KolmogorovSmirnovTest p−Value: 0.725]

KolmogorovSmirnovTest: Ties exist in the data and will be ignored for the KolmogorovSmirnov test, which assumes unique values.

KolmogorovSmirnovTest: Ties exist in the data and will be ignored for the KolmogorovSmirnov test, which assumes unique values.

Out[122]= The null hypothesis that
the data is distributed according to the NormalDistribution[0, 1]
is not rejected at the 5 percent level based on the Kolmogorov-Smirnov test.

KolmogorovSmirnovTest: Ties exist in the data and will be ignored for the KolmogorovSmirnov test, which assumes unique values.

Out[123]=

	Statistic	P-Value
Kolmogorov-Smirnov	0.195644	0.725271

In[124]:=
```
mod3["ParameterTable"]
mod3["RSquared"]
mod3["AdjustedRSquared"]
mod3["ANOVATableFStatistics"]
mod3["ANOVATablePValues"]
e = mod3["FitResiduals"];
ssr = Total[e e]
T = Length[anscombe3];
Sqrt[ssr / (T - 2)]
QuantilePlot[e, PlotLabel → "Problem 3.5 Data Set 3"]
htd = KolmogorovSmirnovTest[e / StandardDeviation[e],
  NormalDistribution[0, 1], "HypothesisTestData"]
htd["TestConclusion"]
htd["TestDataTable"]
```

Out[124]=

	Estimate	Standard Error	t-Statistic	P-Value
1	3.00245	1.12448	2.67008	0.0256191
x	0.499727	0.117878	4.23937	0.00217631

Out[125]= 0.666324

Out[126]= 0.629249

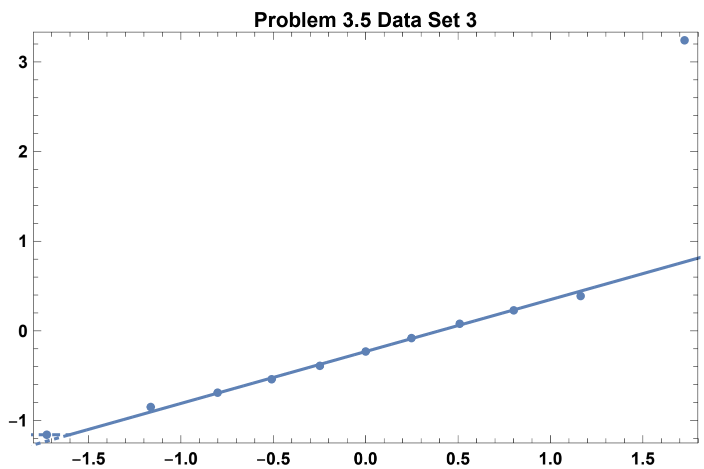
Out[127]= {17.9723}

Out[128]= {0.00217631}

Out[130]= 13.7562

Out[132]= 1.23631

Out[133]=



Out[134]= HypothesisTestData[Type: KolmogorovSmirnovTest p-Value: 0.299]

Out[135]= The null hypothesis that
the data is distributed according to the NormalDistribution[0, 1]
is not rejected at the 5 percent level based on the Kolmogorov-Smirnov test.

Out[136]=

	Statistic	P-Value
Kolmogorov-Smirnov	0.279279	0.298712

In[137]:=
```
mod4["ParameterTable"]
mod4["RSquared"]
mod4["AdjustedRSquared"]
mod4["ANOVATableFStatistics"]
mod4["ANOVATablePValues"]
e = mod4["FitResiduals"];
ssr = Total[e e]
T = Length[anscombe4];
Sqrt[ssr / (T - 2)]
QuantilePlot[e, PlotLabel → "Problem 3.5 Data Set 4"]
htd = KolmogorovSmirnovTest[e / StandardDeviation[e],
  NormalDistribution[0, 1], "HypothesisTestData"]
htd["TestConclusion"]
htd["TestDataTable"]
```

Out[137]=

	Estimate	Standard Error	t-Statistic	P-Value
1	3.00173	1.12392	2.67076	0.0255904
x	0.499909	0.117819	4.24303	0.0021646

Out[138]= 0.666707

Out[139]= 0.629675

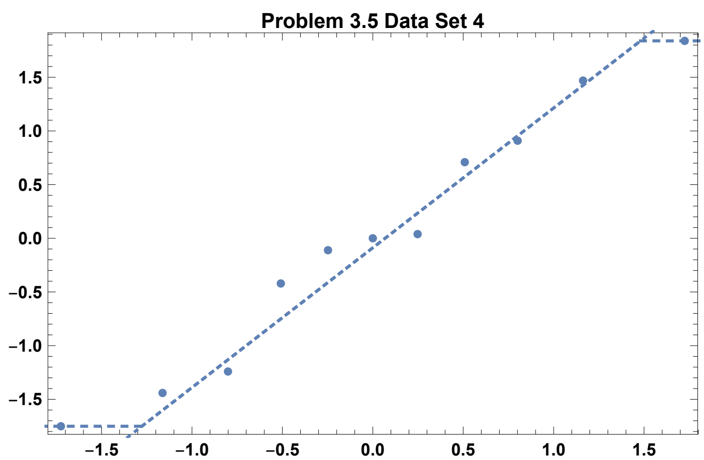
Out[140]= {18.0033}

Out[141]= {0.0021646}

Out[143]= 13.7425

Out[145]= 1.2357

Out[146]=



Out[147]= HypothesisTestData[Type: KolmogorovSmirnovTest p−Value: 0.983]

Out[148]= The null hypothesis that
the data is distributed according to the NormalDistribution[0, 1]
is not rejected at the 5 percent level based on the Kolmogorov-Smirnov test.

Out[149]=

	Statistic	P-Value
Kolmogorov-Smirnov	0.12784	0.983457

In[97]:= **NormalDistribution[0, 1]**

Out[97]= NormalDistribution[0, 1]