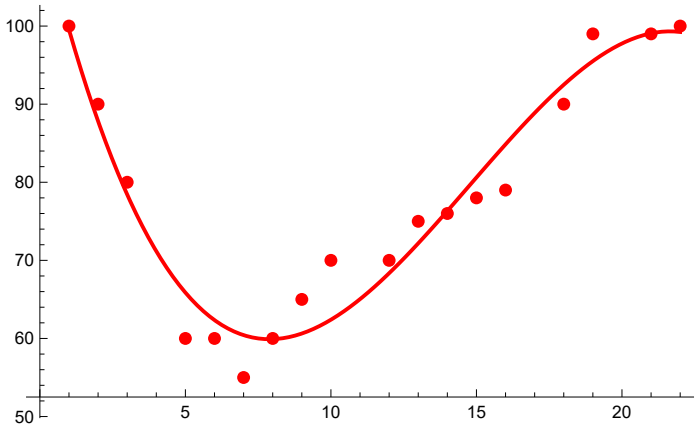
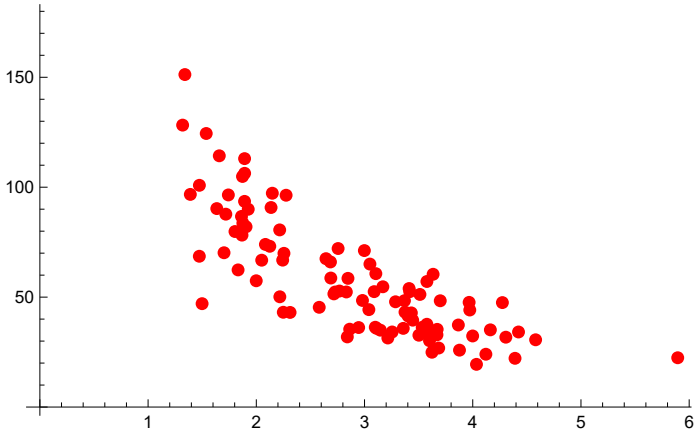
```
xData = {1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 18, 19, 21, 22};
yData = {100, 90, 80, 60, 60, 55, 60, 65, 70, 70, 75, 76, 78, 79, 90, 99, 99, 100};


model = Fit[Transpose[{xData, yData}], {1, x, x^2, x^3}, x];


xLine = Subdivide[1, 22, 100];
yLine = model /. x → # & /@ xLine;


Show[
   ListPlot[Transpose[{xData, yData}], PlotStyle → Red, PlotMarkers → Automatic],
   ListLinePlot[Transpose[{xLine, yLine}], PlotStyle → Red]
]
```

Out[ ]=



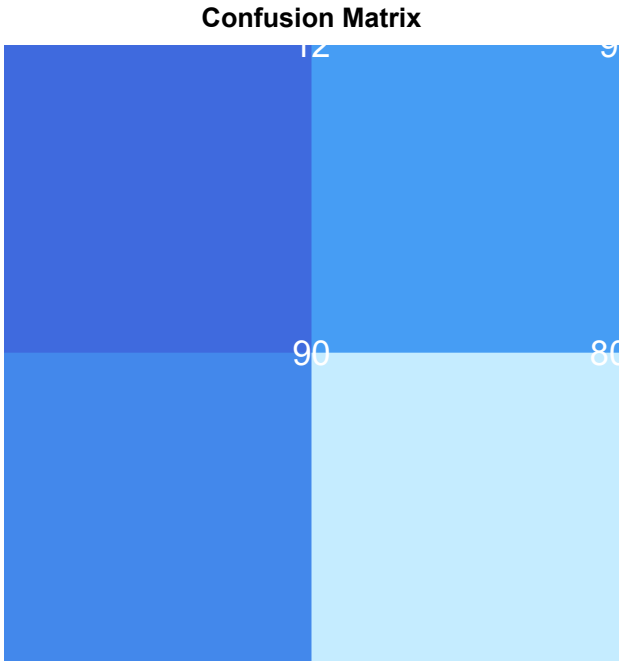
In[ ]:=
```
SeedRandom[2];

x = RandomVariate[NormalDistribution[3, 1], 100];
y = RandomVariate[NormalDistribution[150, 40], 100] / x;

ListPlot[Transpose[{x, y}], PlotStyle → Red, PlotMarkers → Automatic]
```

Out[ ]=



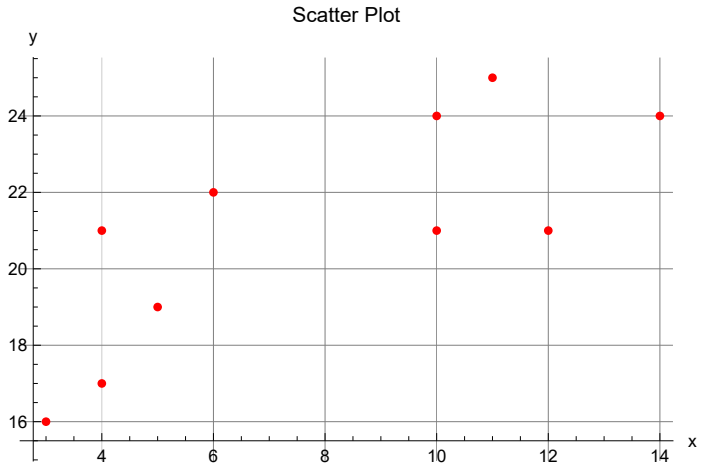
In[•]:=
```
confusionMatrix = {{12, 93}, {90, 805}};

MatrixPlot[
   confusionMatrix,
   ColorFunction → "DeepSeaColors",
   FrameTicks → {{Automatic, None}, {Automatic, None}},
   FrameLabel → {"Predicted label", "True label"},
   FrameStyle → Directive[Bold, White],
   PlotLabel → Style["Confusion Matrix", Bold, 14],
   AspectRatio → 1,
   ColorFunctionScaling → True,
   Epilog → {
       Inset[Style[Text[confusionMatrix[[1, 1]]], Bold, FontSize → 18, White], {1, 2}],
       Inset[Style[Text[confusionMatrix[[1, 2]]], Bold, FontSize → 18, White], {2, 2}],
       Inset[Style[Text[confusionMatrix[[2, 1]]], Bold, FontSize → 18, White], {1, 1}],
       Inset[Style[Text[confusionMatrix[[2, 2]]], Bold, FontSize → 18, White], {2, 1}]
     }
]
```

Out[•]=



In[•]:=
```
x = {4, 5, 10, 4, 3, 11, 14, 6, 10, 12};
y = {21, 19, 24, 17, 16, 25, 24, 22, 21, 21};

ListPlot[Transpose[{x, y}], PlotStyle → {Red, PointSize[Medium]},
 AxesLabel → {"x", "y"}, PlotLabel → "Scatter Plot", GridLines → Automatic]
```

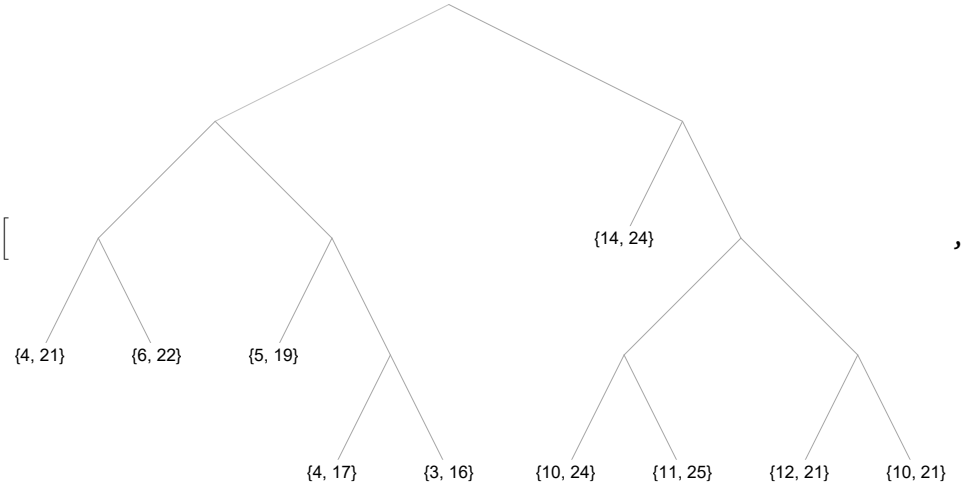
Out[•]=



In[•]:=
```
x = {4, 5, 10, 4, 3, 11, 14, 6, 10, 12};
y = {21, 19, 24, 17, 16, 25, 24, 22, 21, 21};

data = Transpose[{x, y}];

hc = ClusteringTree[data, DistanceFunction → EuclideanDistance];

DendrogramPlot[hc,
   Orientation → Top,
   Method → "Ward",
   Frame → True,
   FrameTicks → {{Automatic, None}, {Automatic, None}},
   FrameLabel → {"Index", "Height"},
   PlotRange → All,
   AspectRatio → 1 / 2]
```

Out[•]=

DendrogramPlot[

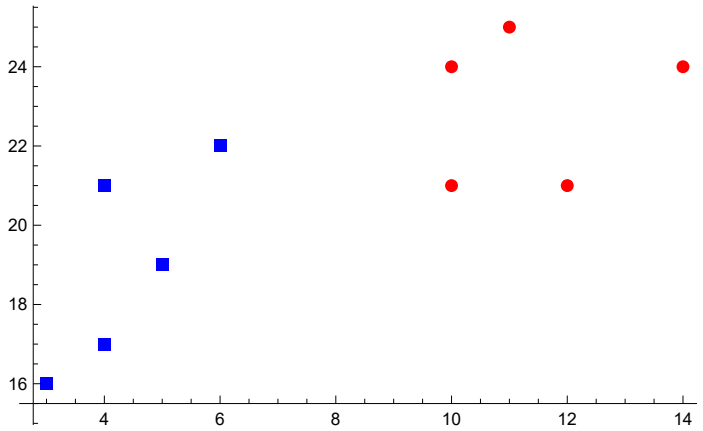


,

Orientation → Top, Method → Ward, Frame → True,
FrameTicks → {{Automatic, None}, {Automatic, None}},
FrameLabel → {Index, Height}, PlotRange → All, AspectRatio → $\frac{1}{2}$]

```
x = {4, 5, 10, 4, 3, 11, 14, 6, 10, 12};
y = {21, 19, 24, 17, 16, 25, 24, 22, 21, 21};

data = Transpose[{x, y}];

hc = FindClusters[data, UpTo[2], DistanceFunction → EuclideanDistance,
     Method → "Agglomerate"];

ListPlot[hc, PlotStyle → {Red, Blue}, PlotMarkers → Automatic]
```

Out[•]=



In[•]:=
```
X = {3.78, 2.44, 2.09, 0.14, 1.72, 1.65, 4.92, 4.37, 4.96, 4.52, 3.69, 5.88};
y = {0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1};

logr = Classify[Thread[X → y], Method → "LogisticRegression"];

predicted = logr[3.46]

probability = logr[3.46, "Probabilities"]
```

Out[•]=

```
1
```

Out[•]=

```
⟨| 0 → 0.490179, 1 → 0.509821 |⟩
```

In[•]:=
```
X = {3.78, 2.44, 2.09, 0.14, 1.72, 1.65, 4.92, 4.37, 4.96, 4.52, 3.69, 5.88};
y = {0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1};

logr = Classify[Thread[X → y], Method → "LogisticRegression"];

lm = LogitModelFit[Transpose[{X, y}], x, x];

logOdds = lm["BestFitParameters"][[2]];

odds = Exp[logOdds]

{logOdds, odds}
```

LogitModelFit: The number of unique basis functions is 9 fewer than the number of basis functions specified in {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}. Duplicated basis functions will be removed.

LogitModelFit: {4, 5, 10, 4, 3, 11, 14, 6, 10, 12} is not a valid variable.

Part: Part 2 of LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0}, {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}}, {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}, {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][BestFitParameters] does not exist.

Out[•]=
```
e^LogitModelFit[{{3.78,0},{2.44,0},{2.09,0},{0.14,0},{1.72,0},{1.65,0},{4.92,1},{4.37,1},{4.96,1},{4.52,1},{3.69,1},{5.88,
```

Out[•]=
```
{LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
    {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}}, {4, 5, 10, 4,
    3, 11, 14, 6, 10, 12}, {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][BestFitParameters][[2]],
 e^LogitModelFit[{{3.78,0},{2.44,0},{2.09,0},{0.14,0},{1.72,0},{1.65,0},{4.92,1},{4.37,1},{4.96,1},{4.52,1},{3.69,1},{5.8
}
```

```
X = {3.78, 2.44, 2.09, 0.14, 1.72, 1.65, 4.92, 4.37, 4.96, 4.52, 3.69, 5.88};
y = {0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1};

logr = LogitModelFit[Transpose[{X, y}], x];

probabilities = logr["ProbabilityFunction"] /@ X

probabilities
```

Out[•]=

```
{LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0},
     {1.65, 0}, {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][3.78],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][2.44],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][2.09],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][0.14],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][1.72],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][1.65],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][4.92],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][4.37],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][4.96],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][4.52],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][3.69],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][5.88]}
```

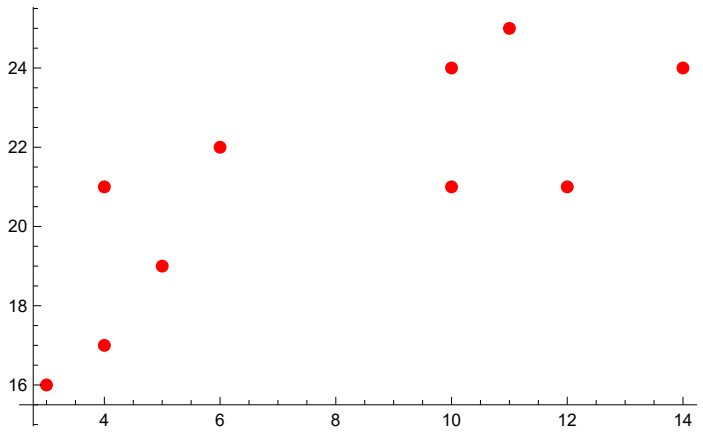
Out[•]=

```
{LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0},
     {1.65, 0}, {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][3.78],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][2.44],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][2.09],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][0.14],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][1.72],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][1.65],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][4.92],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][4.37],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][4.96],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][4.52],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][3.69],
 LogitModelFit[{{3.78, 0}, {2.44, 0}, {2.09, 0}, {0.14, 0}, {1.72, 0}, {1.65, 0},
     {4.92, 1}, {4.37, 1}, {4.96, 1}, {4.52, 1}, {3.69, 1}, {5.88, 1}},
    {4, 5, 10, 4, 3, 11, 14, 6, 10, 12}][ProbabilityFunction][5.88]}
```

In[•]:=
```
iris = ExampleData["Dataset"];
X = iris[[All, 1 ;; 4]];
y = iris[[All, 5]];

CList = {0.25, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2};

scoreForC[c_] := Module[{model, accuracy}, model = Classify[Thread[X → y],
    Method → {"LogisticRegression", "RegularizationStrength" → c}];
  accuracy = Mean[MapThread[Equal, {model /@ X, y}]];
  accuracy]

scores = scoreForC /@ CList

scores
```

In[•]:=
```
x = {4, 5, 10, 4, 3, 11, 14, 6, 10, 12};
y = {21, 19, 24, 17, 16, 25, 24, 22, 21, 21};


ListPlot[Transpose[{x, y}], PlotStyle → Red, PlotMarkers → Automatic]
```

Out[•]=



```
x = {4, 5, 10, 4, 3, 11, 14, 6, 10, 12};
y = {21, 19, 24, 17, 16, 25, 24, 22, 21, 21};

data = Transpose[{x, y}];

inertias = Table[
    Total[Map[Norm, data - (Mean /@ FindClusters[data, i])]^2],
    {i, 1, 10}
  ];

ListLinePlot[inertias,
  Frame → True,
  FrameLabel → {"Number of Clusters", "Inertia"},
  PlotMarkers → Automatic,
  PlotRange → All,
  Epilog → {Red, PointSize[Medium], Point[Transpose[{Range[1, 10], inertias}]]},
  PlotLabel → "Elbow Method"]
```

••• Thread: Objects of unequal length in

{{4, 21}, {5, 19}, {10, 24}, {4, 17}, {3, 16}, {11, 25}, {14, 24}, {6, 22}, {10, 21}, {12, 21}} + $\left\{\left\{-\frac{79}{10}, -21\right\}\right\}$ cannot be combined.

••• Thread: Objects of unequal length in

{{4, 21}, {5, 19}, {10, 24}, {4, 17}, {3, 16}, {11, 25}, {14, 24}, {6, 22}, {10, 21}, {12, 21}} + $\left\{\left\{-\frac{57}{5}, -23\right\}, \left\{-\frac{22}{5}, -19\right\}\right\}$ cannot be combined.

••• Thread: Objects of unequal length in

{{4, 21}, {5, 19}, {10, 24}, {4, 17}, {3, 16}, {11, 25}, {14, 24}, {6, 22}, {10, 21}, {12, 21}} + $\left\{\left\{-\frac{57}{5}, -23\right\}, \left\{-4, -\frac{52}{3}\right\}, \left\{-5, -\frac{43}{2}\right\}\right\}$ cannot be combined.

••• General: Further output of Thread::tdlen will be suppressed during this calculation.

Out[•]=