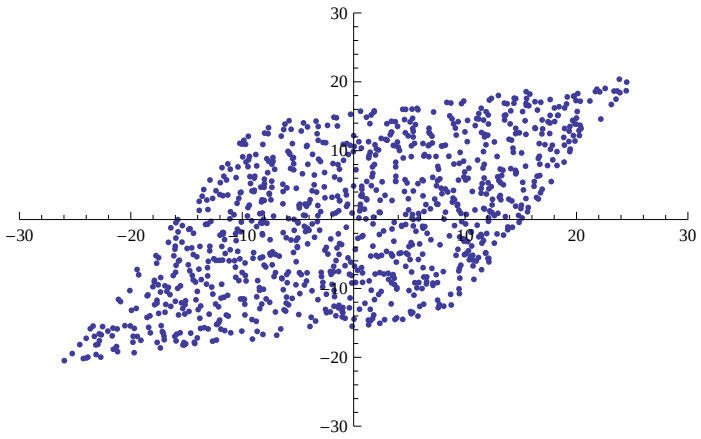
In[228]:=
```
(*FastICA Uniform*)
x = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
y = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
A = {{5, 10}, {10, 2}};
mt = A.{x, y};
mt = mt - Mean[Transpose[mt]];
```

In[233]:=
```
ma = Transpose[mt];
ListPlot[{ma[[All]]}, PlotRange → {{-30, 30}, {-30, 30}}]
```

Out[234]=



In[235]:=
```
Covariance[Transpose[mt]]
```

Out[235]=
```
{{126.498, 68.9804}, {68.9804, 102.357}}
```

In[236]:=
```
Eigenvalues[Covariance[Transpose[mt]]]
```

Out[236]=
```
{184.456, 44.3991}
```

In[237]:=
```
Eigenvectors[Covariance[Transpose[mt]]]
```

Out[237]=
```
{{-0.765625, -0.643287}, {0.643287, -0.765625}}
```

In[238]:=
```
d12 = 1 / Sqrt[Eigenvalues[Covariance[Transpose[mt]]][[1]]]
d22 = 1 / Sqrt[Eigenvalues[Covariance[Transpose[mt]]][[2]]]
dmat = DiagonalMatrix[{d12, d22}]
```

Out[238]=
```
0.0736298
```

Out[239]=
```
0.150077
```

Out[240]=
```
{{0.0736298, 0.}, {0., 0.150077}}
```

In[241]:=
```
emat = Transpose[Eigenvectors[Covariance[Transpose[mt]]]]
```

Out[241]=
```
{{-0.765625, 0.643287}, {-0.643287, -0.765625}}
```

In[242]:=
```
vmat = emat.dmat.Transpose[emat]
```

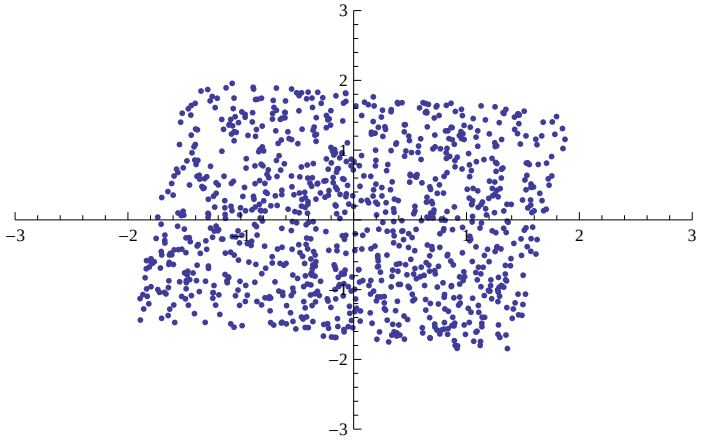
Out[242]=
```
{{0.105265, -0.0376513}, {-0.0376513, 0.118442}}
```

In[243]:=
```
x = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
y = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
mt = A.{x, y};
mt = mt - Mean[Transpose[mt]];
```

In[247]:=
```
zmat = vmat.mt;
```

In[248]:=
```
za = Transpose[zmat];
ListPlot[{za[[All]]}, PlotRange → {{-3, 3}, {-3, 3}}]
```

Out[249]=



In[257]:=
```
w = {1, 0};
(*w={2,20};//N*)
(*w=w/Norm[w]//N*)
epsilon = 0.00001;
n = Length[x];
cnt = 1;
wbefore = w;
While[cnt < n,
 wbefore = w;
 w = (1 / n) * Sum[((w.zmat[[All, i]])^3) * zmat[[All, i]], {i, 1, n}] - 3 * w;
 w = w / Norm[w];
 Print["cnt=", cnt];
 Print["w=", w];
 If[1 - epsilon <= Abs[w.wbefore] && Abs[w.wbefore] <= 1 + epsilon,
  Print["収束した:"];
  Print["w=", w];
  Print["cnt=", cnt];
  Print["Abs[w.wbefore]=", Abs[w.wbefore]];
  cnt = n;
 ];
 ++cnt;
]
Kurtosis[w.zmat] - 3
```

```
cnt=1
w={-0.990756, 0.135657}
cnt=2
w={0.985814, -0.167844}
cnt=3
w={-0.984643, 0.174581}
cnt=4
w={0.984392, -0.175989}
収束した:
w={0.984392, -0.175989}
cnt=4
Abs[w.wbefore]=0.999999
```

Out[263]= -1.14938

In[264]:=
```
(* True Value*)
tmat = vmat.A;
truemat = {};
i = 1;
While[i ≤ 2,
  truemat = Append[truemat, tmat[[All, i]] / Norm[tmat[[All, i]]]];
  i++;
 ];
truemat = Transpose[truemat];
MatrixForm[truemat]
```

Out[269]//MatrixForm=

$$\begin{pmatrix} 0.148716 & 0.989948 \\ 0.98888 & -0.141431 \end{pmatrix}$$

In[270]:=
```
w = RandomReal[{-Sqrt[3], Sqrt[3]}, 2];
(*w={1,0};*)

(*w={2,20};//N*)

(*w=w/Norm[w]//N*)
epsilon = 0.00001;
n = Length[x];
cnt = 1;
wbefore = w;
While[cnt < n,
  wbefore = w;
  w = (1 / n) * Sum[((w.zmat[[All, i]])^3) * zmat[[All, i]], {i, 1, n}] - 3 * w;
  w = w / Norm[w];
  Print["cnt=", cnt];
  Print["w=", w];
  If[1 - epsilon <= Abs[w.wbefore] && Abs[w.wbefore] <= 1 + epsilon,
   Print["収束した:"];
   Print["w=", w];
   Print["cnt=", cnt];
   Print["Abs[w.wbefore]=", Abs[w.wbefore]];
   cnt = n
  ];
  ++cnt;
 ];
Kurtosis[w.zmat] - 3
```

```
cnt=1
w={0.810721, 0.585432}
cnt=2
w={-0.844818, -0.535053}
cnt=3
w={0.909132, 0.416507}
cnt=4
w={-0.983537, -0.180707}
cnt=5
w={0.998074, -0.0620311}
cnt=6
w={-0.988444, 0.151587}
cnt=7
w={0.985239, -0.171186}
cnt=8
w={-0.984519, 0.175279}
収束した:
w={-0.984519, 0.175279}
cnt=8
Abs[w.wbefore]=0.999991
```

Out[276]= −1.14934

In[277]:= **MatrixForm[truemat]**

Out[277]//MatrixForm=

$$\begin{pmatrix} 0.148716 & 0.989948 \\ 0.98888 & -0.141431 \end{pmatrix}$$