```
(*FastICA Negentropy Uniform. Initial value is w=
 {1,0} and w=w=RandomReal[{-Sqrt[3],Sqrt[3]},2] *)
x = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
y = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];

A = {{5, 10}, {10, 2}};

mt = A.{x, y};
```

In[441]:=
```
ma = Transpose[mt];
ListPlot[{ma[[All]]}, PlotRange → {{-30, 30}, {-30, 30}}];

mt = mt - Mean[Transpose[mt]];


Covariance[Transpose[mt]]
```

```
{{127.846, 71.8281}, {71.8281, 103.734}}
```

```
Eigenvalues[Covariance[Transpose[mt]]]
```

```
{188.623, 42.957}
```

```
Eigenvectors[Covariance[Transpose[mt]]]
```

```
{{-0.763391, -0.645937}, {0.645937, -0.763391}}
```

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

```
0.072812
```

```
0.152575
```

```
{{0.072812, 0.}, {0., 0.152575}}
```

```
emat = Transpose[Eigenvectors[Covariance[Transpose[mt]]]]
```

```
{{-0.763391, 0.645937}, {-0.645937, -0.763391}}
```

```
vmat = emat.dmat.Transpose[emat]
```

```
{{0.106092, -0.0393313}, {-0.0393313, 0.119295}}
```

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

zmat = vmat.mt;
```

In[443]:=
```
za = Transpose[zmat];
ListPlot[{za[[All]]}, PlotRange → {{-3, 3}, {-3, 3}}];
```

```
(*
w=RandomReal[{-Sqrt[3],Sqrt[3]},2];
*)

w = {1, 0};

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

(*w=w/Norm[w]//N*)
epsilon = 0.0001;
n = Length[x];
cnt = 1;
wbefore = w;
While[cnt < n,
 wbefore = w;
 w = (1 / n) * Sum[Tanh[w.zmat[[All, i]]] * zmat[[All, i]], {i, 1, n}] -
    (1 / n) * Sum[1 - (Tanh[w.zmat[[All, i]]])^2, {i, 1, n}] * 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={0.997142, -0.0755494}
cnt=2
w={0.99681, -0.0798065}
収束した:
w={0.99681, -0.0798065}
cnt=2
Abs[w.wbefore]=0.999991
-1.263
```

```
(* 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]
```

$$\begin{pmatrix} 0.13637 & 0.98782 \\ 0.990658 & -0.155599 \end{pmatrix}$$

```
w = RandomReal[{-Sqrt[3], Sqrt[3]}, 2];
epsilon = 0.0001;
n = Length[x];
cnt = 1;
wbefore = w;
While[cnt < n,
 wbefore = w;
 w = (1 / n) * Sum[Tanh[w.zmat[[All, i]]] * zmat[[All, i]], {i, 1, n}] -
    (1 / n) * Sum[1 - (Tanh[w.zmat[[All, i]]])^2, {i, 1, n}] * 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={-0.9881, 0.153811}
cnt=2
w={-0.996591, 0.0824949}
cnt=3
w={-0.996786, 0.0801079}
収束した:
w={-0.996786, 0.0801079}
cnt=3
Abs[w.wbefore]=0.999997
-1.26312
```

```
MatrixForm[truemat]
```

$$\begin{pmatrix} 0.13637 & 0.98782 \\ 0.990658 & -0.155599 \end{pmatrix}$$