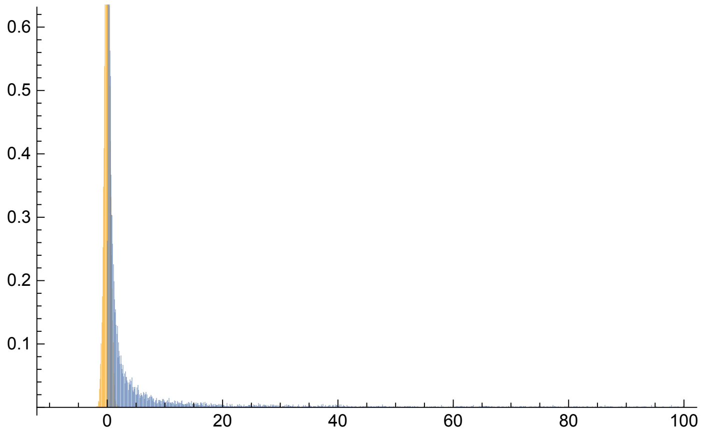
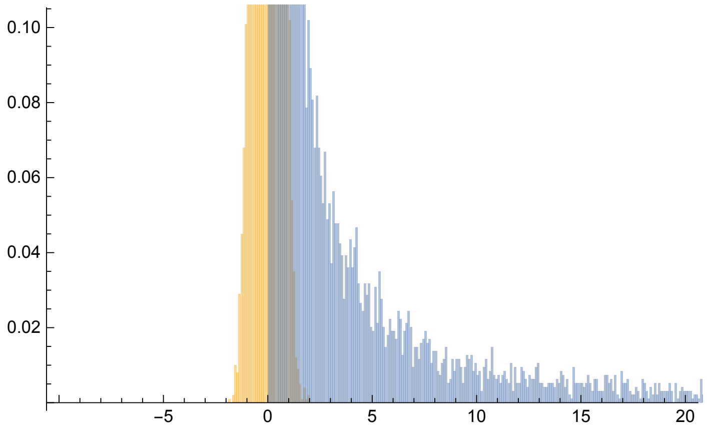
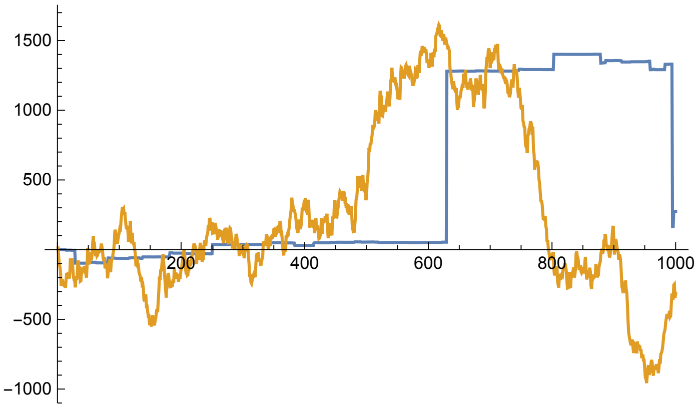
```
(* the Levy flight is investigated in detail *)
(* http://reference.wolfram.com/language/ref/LevyDistribution.html *)

(* draw 10000 values *)
dataL = RandomVariate[LevyDistribution[0, 0.5], 10000];
(* eliminate values bigger than 100 to make data more plotable... *)
dataL = DeleteCases[dataL, x_ /; x > 100];
(* compare to normal distribution *)

dataR = RandomVariate[NormalDistribution[0, 0.5], 10000];
Show[Histogram[{dataR, dataL}, 1000, "ProbabilityDensity",
  PlotRange → {{-10, 100}, {0.00, 0.6}}]] (* ScalingFunctions→{"lin","log"} *)
```



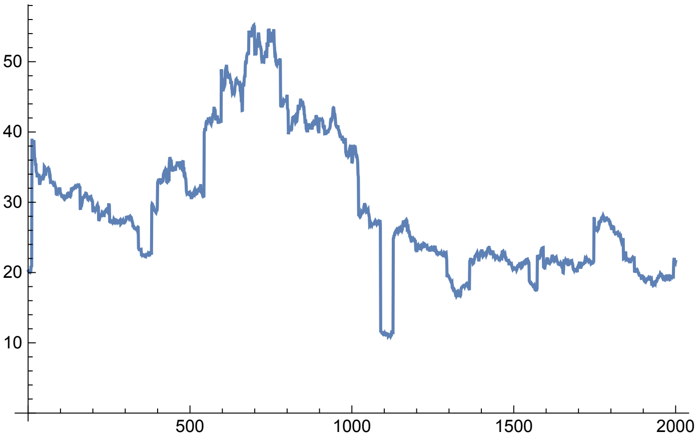
```
Show[Histogram[{dataR, dataL}, 1000,
  "ProbabilityDensity", PlotRange → {{-10, 20}, {0.00, 0.1}}]]
```



```
(* create up or down Levy steps *)
dL = RandomVariate[LevyDistribution[0.001, 0.005], 1000];
dLs = 2 * (RandomInteger[1, 1000] - 0.5);
dL = dL * dLs;
dR = 100 * RandomVariate[NormalDistribution[0, 0.5], 1000];
dLa = Accumulate[dL];
dRa = Accumulate[dR];
ListLinePlot[{dLa, dRa}]
```

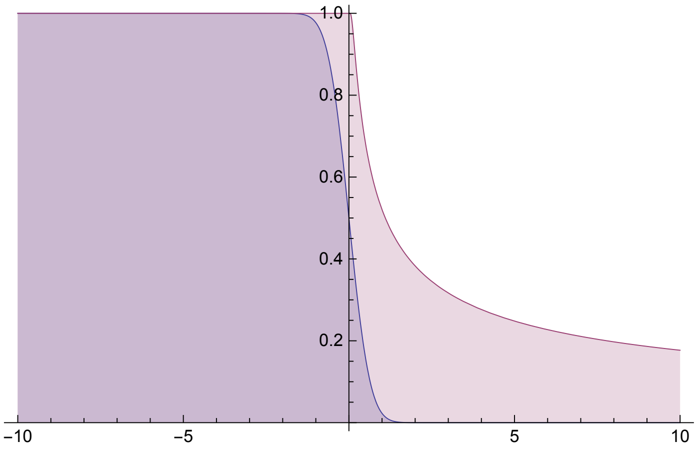


```
(* We look at a more benign form than
   the pure Levy flight => the stable distribution *)
dLogReturn = RandomVariate[StableDistribution[1, 1.38, -0.096, -0.001, 0.005], 2000];
dLa = 20 * Exp[Accumulate[dLogReturn]];
ListLinePlot[dLa]
```

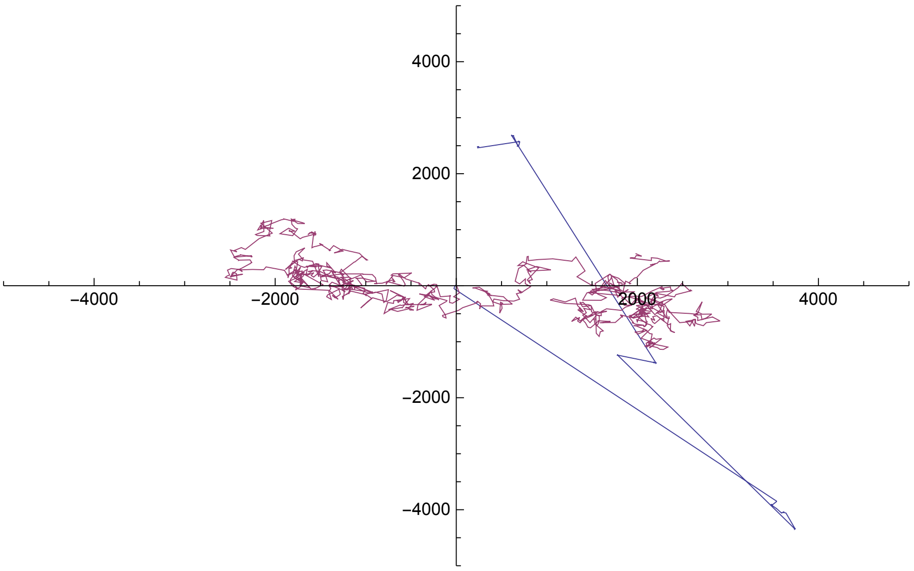


```
(* Assuming stock logarithmic return follows a stable distribution,
find the value at risk at the 95% level: *)

logD = StableDistribution[1, 1.38, -0.096, -0.001, 0.005];
(* reference.wolfram.com/language/ref/InverseSurvivalFunction.html *)
VaR = InverseSurvivalFunction[logD, 0.95]

-0.0186983
```

```
su1 = SurvivalFunction[NormalDistribution[0, 0.5]];
su2 = SurvivalFunction[LevyDistribution[0, 0.5]];
Plot[{su1[x], su2[x]}, {x, -10, 10}, Filling → Axis]
```



```
NN = 1000;
(* create a 2D walk with Gauss and Levy *)
dLx = RandomVariate[LevyDistribution[0.0, 0.005], NN];
dLx1 = RandomVariate[NormalDistribution[0.0, 100], NN];
dLP = RandomReal[{0, 2 * Pi}, NN];
dLP1 = RandomReal[{0, 2 * Pi}, NN];
x = {0}; y = {0}; x1 = {0}; y1 = {0};
For[j = 0, j < NN, j++;
  dr = dLx[[j]] * Exp[I * dLP[[j]]];
  AppendTo[x, x[[j]] + Re[dr]];
  AppendTo[y, y[[j]] + Im[dr]]];
For[j = 0, j < NN, j++;
  dr = dLx1[[j]] * Exp[I * dLP1[[j]]];
  AppendTo[x1, x1[[j]] + Re[dr]];
  AppendTo[y1, y1[[j]] + Im[dr]]];
ListLinePlot[{Transpose[{x, y}], Transpose[{x1, y1}]},
 PlotRange → {{-5000, +5000}, {-5000, 5000}}]
```


4000
2000
–2000
–4000
–4000
–2000
2000
4000