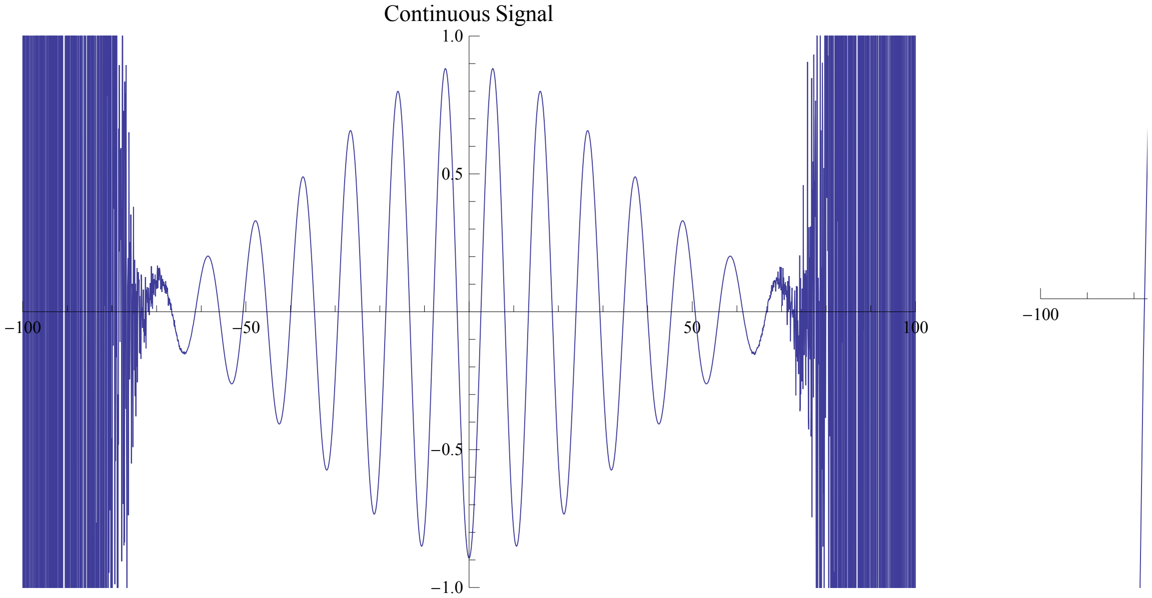
# Fake Signal

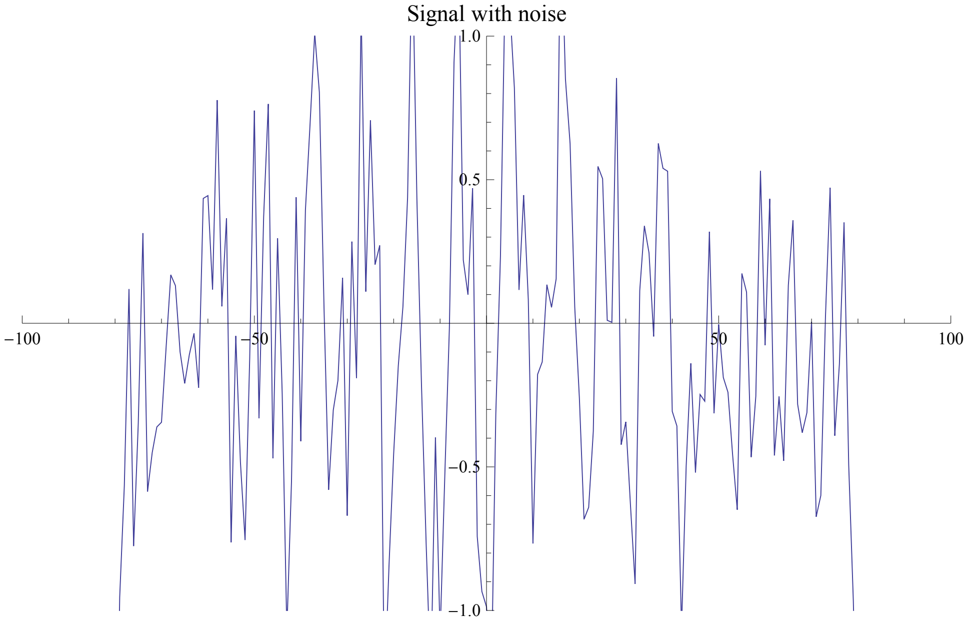
- Random noise with Sin function inserted at random places
- Sin function is modified by Gussian to have non-trivial frequency domain shape

```
In[220]:= sizeIm = 500;
noiseAmp = 0.7;
Samples = 512 * 1000;
nPeaks = 5;
(* Creating noise signal *)
discreteSignal = Table[RandomReal[{-noiseAmp, noiseAmp}], {Samples}];
(* Creating peak which is to be mixed into noise *)
peak[x_] := WaveletPsi[DGaussianWavelet[200], x / 24];
discretepeak[k_Integer] := WaveletPsi[DGaussianWavelet[200], k / 24];
gaussiansin = Table[discretepeak[k], {k, -80, 80}];
gaussiansinnoise =
  Table[discretepeak[k] + RandomReal[{-noiseAmp, noiseAmp}], {k, -80, 80}];
(* Choosing where to mix the peaks *)
mixTimes = Table[RandomInteger[Samples - 1000], {nPeaks}];
(* Mixing in the peaks *)
For[i = 1, i <= nPeaks, i++,
 discreteSignal =
   Flatten[Insert[discreteSignal, gaussiansinnoise, mixTimes[[i]] ]];
]
GraphicsRow[{
  Plot[peak[x], {x, -100, 100}, PlotRange → {{-100, 100}, {-1.0, 1.0}},
   ImageSize → sizeIm, PlotLabel → "Continuous Signal"],
  ListLinePlot[gaussiansin, PlotRange → {{-100, 100}, {-1.0, 1.0}},
   DataRange → {-80, 80}, ImageSize → sizeIm], PlotLabel → "Sampled Signal"}
]
ListLinePlot[gaussiansinnoise, PlotRange → {{-100, 100}, {-1.0, 1.0}},
 DataRange → {-80, 80}, ImageSize → sizeIm, PlotLabel → "Signal with noise"]
GraphicsRow[{
  ListLinePlot[RotateLeft[ Abs[Fourier[gaussiansin]] , 81], PlotRange → All,
   ImageSize → sizeIm, PlotLabel → "Signal in frequency domain"],
  ListLinePlot[RotateLeft[ Abs[Fourier[gaussiansinnoise]] , 81], PlotRange → All,
   ImageSize → sizeIm, PlotLabel → "Signal in frequency domain with noise"]
 }]
```

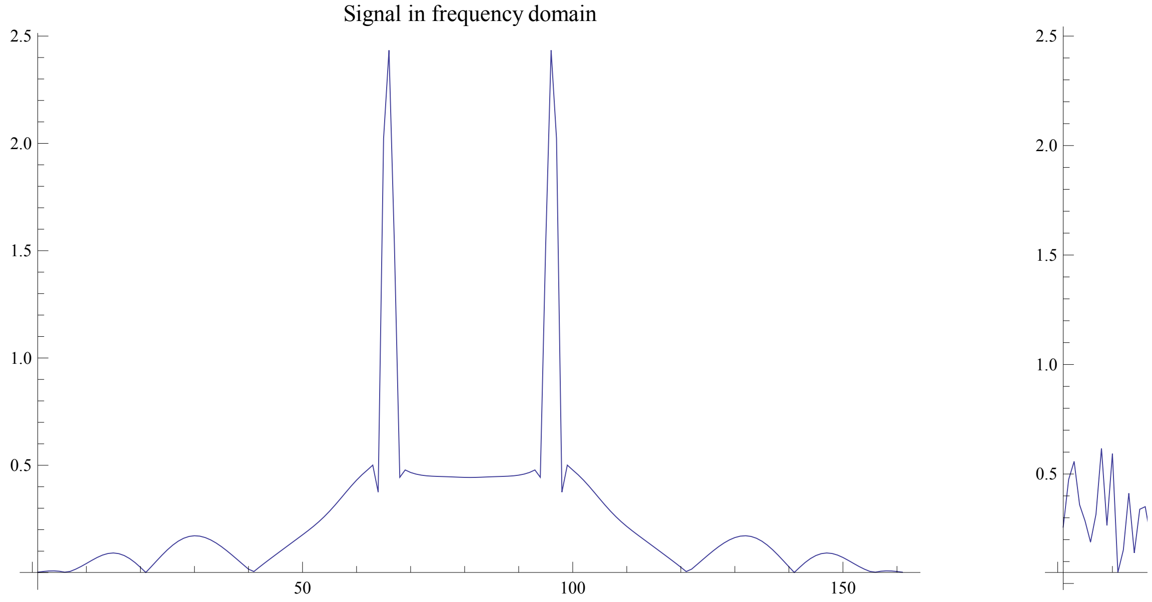
Out[231]=



Out[232]=



Out[233]=



```
Clear[result];
listlength = Length[discreteSignal];
result = List[];
For[f = 1, f ≤ listlength, f++,
  result = Append[result, {discreteSignal[[f]], 0}];
 ];
path = "C:\\Skola\\Projekty\\Artemis\\";
Export[path <> "fakedata2.dat", result, "Table", "FieldSeparators" → " "];
```

```
path = "C:\\Skola\\Projekty\\Artemis\\";
Export[path <> "fakedata1.dat",
  discreteSignal, "Table", "FieldSeparators" → " "];
```