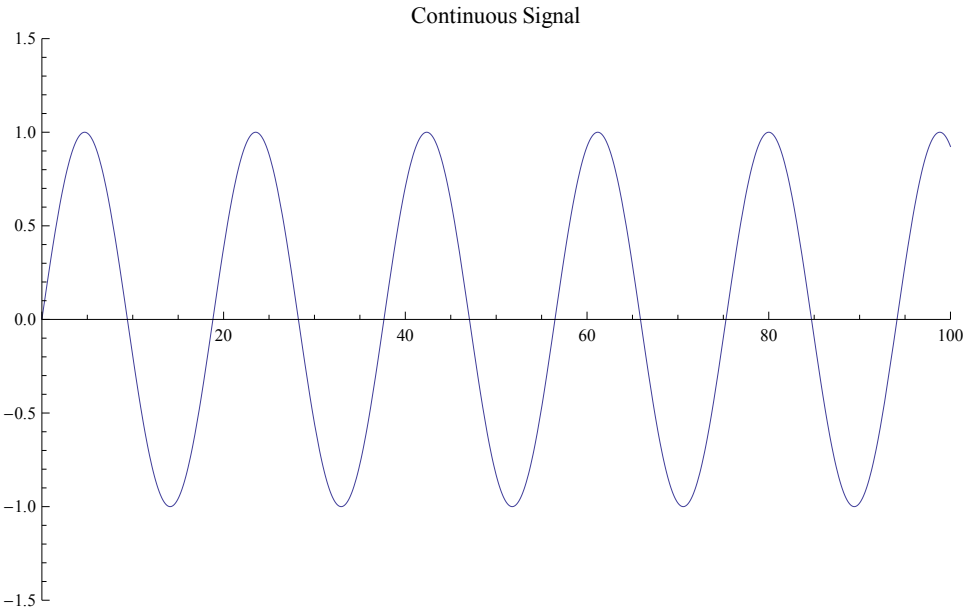
Example 2

- One Sin function with non-integer number of periods
- non-integer number of periods causing leakage

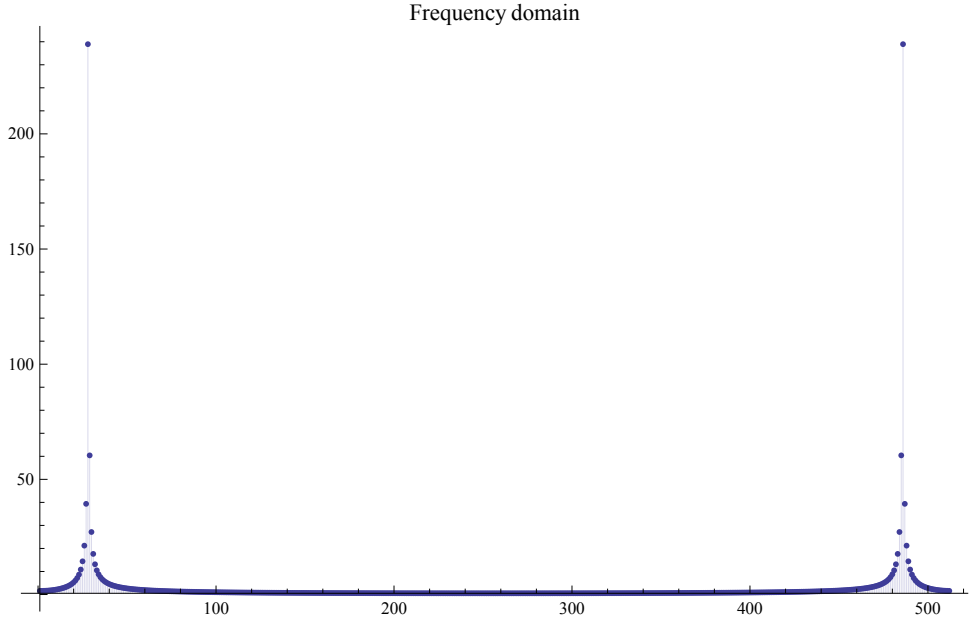
```
sizeIm = 500;
samplerate = 512;
Samples = 8 * 512;
Clear[f1, f2, a1, a2, analogSignal, discreteSignal,
  SampledData, DataforSpectra, DFTSpectra, result];
f3 = 3.4 / 64;
analogSignal2[k_] := Sin[2 * Pi * f3 * k];
discreteSignal2[k_Integer] := Sin[2 * Pi * f3 * k];
SampledData = Table[discreteSignal2[k], {k, 0, Samples - 1}];
DataforSpectra = Take[SampledData, samplerate];
DFTSpectra = Fourier[DataforSpectra, FourierParameters → {1, -1}];

Clear[result];
listlength = Length[SampledData];
result = List[];
For[f = 1, f ≤ listlength, f++,
  result = Append[result, {SampledData[[f]], 0}];
 ];
path = "D:\\Skola\\Projekty\\Artemis\\";
Export[path <> "example2.tap", result, "Table", "FieldSeparators" → " "];

Export[path <> "example2.tap", SampledData, "Table", "FieldSeparators" → " "];

Plot[analogSignal2[k], {k, 0, 100},
 PlotRange → {{0, 100}, {-1.5, 1.5}}, PlotLabel → "Continuous Signal"]
ListPlot[Abs[DFTSpectra], Filling → Axis, PlotRange → All,
 ImageSize → sizeIm, PlotLabel → "Frequency domain"]
```

Out[328]=



Frequency domain

Out[329]=



In[360]:=

```
indatawithDFT =
  Import["example2_w_DFT.dat", Path → "D:\\skola\\Projekty\\artemis\\"];
indatawithDFTcomplex = Table[indatawithDFT[[i, 1]] + I * indatawithDFT[[i, 2]],
   {i, 1, Length[indatawithDFT]}];
ListPlot[ RotateLeft[ Abs[indatawithDFTcomplex] , 257],
 Filling → Axis, PlotRange → All, ImageSize → 500,
 PlotLabel → "Frequency domain after FIR Filter"]
```

Frequency domain after FIR Filter

Out[362]=