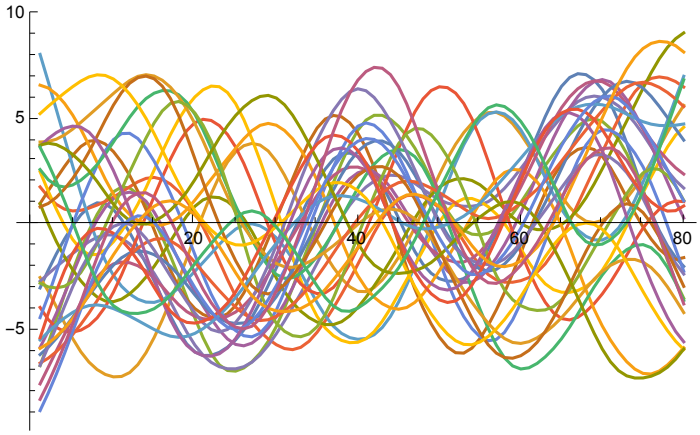
# Feature Exploration

## Dataset Appearance

In[129]:=
```
featYes = Table[reducedOxyYes80[[x, 1]], {x, 30}];
featNo = Table[reducedOxyNo80[[x, 1]], {x, 30}];
ListLinePlot[featYes]
```

Out[131]=




In[132]:=
```
ListLinePlot[featNo]
```

Out[132]=


## General Statistics

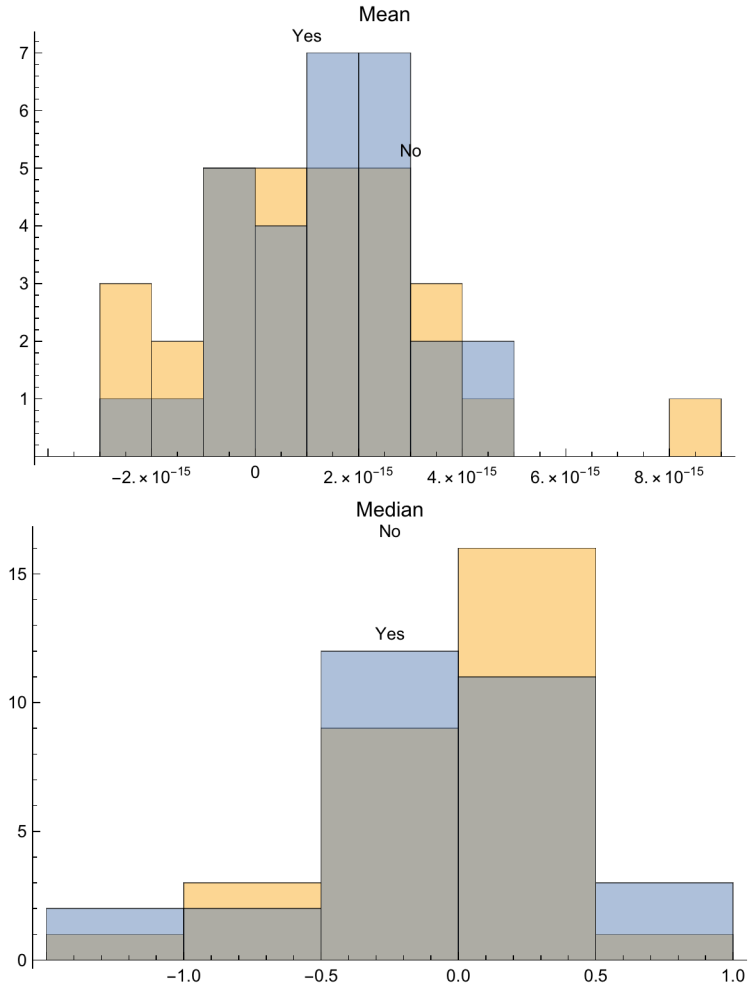
In[41]:=
```
featExplore[f_] := Histogram[{Table[f[reducedOxyNo80[[x, 1]]], {x, 30}],
    Table[f[reducedOxyYes80[[x, 1]]], {x, 30}]},
  ChartLabels → Placed[{"No", "Yes"}, Above], PlotLabel → f]
```

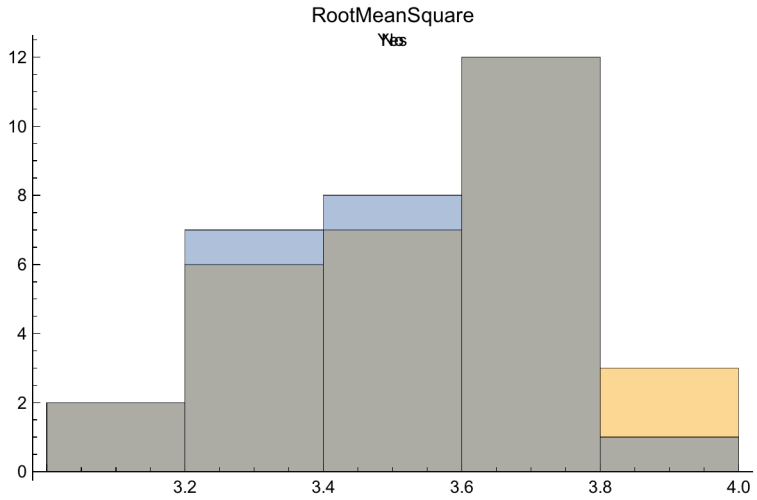
In[52]:=
```
energy = Total@(#^2) &
stats = {Mean, Median, RootMeanSquare, TrimmedMean, HarmonicMean,
  GeometricMean, ContraharmonicMean, Variance, StandardDeviation,
  MeanDeviation, MedianDeviation, QuartileDeviation, InterquartileRange,
  Skewness, Kurtosis, QuartileSkewness, Entropy, energy}
```

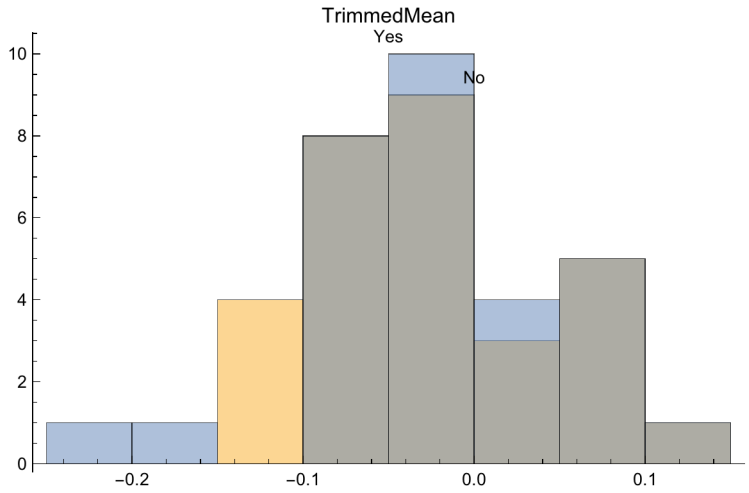
Out[52]=
$$\text{Total}\left[\#1^2\right]\ \&$$

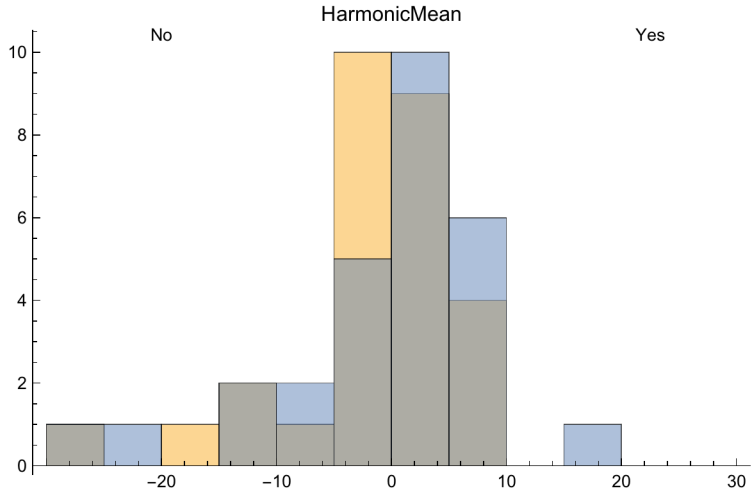
Out[53]=
$$\left\{\text{Mean}, \text{Median}, \text{RootMeanSquare}, \text{TrimmedMean}, \text{HarmonicMean}, \text{GeometricMean}, \text{ContraharmonicMean}, \text{Variance}, \text{StandardDeviation}, \text{MeanDeviation}, \text{MedianDeviation}, \text{QuartileDeviation}, \text{InterquartileRange}, \text{Skewness}, \text{Kurtosis}, \text{QuartileSkewness}, \text{Entropy}, \text{Total}\left[\#1^2\right]\ \&\right\}$$

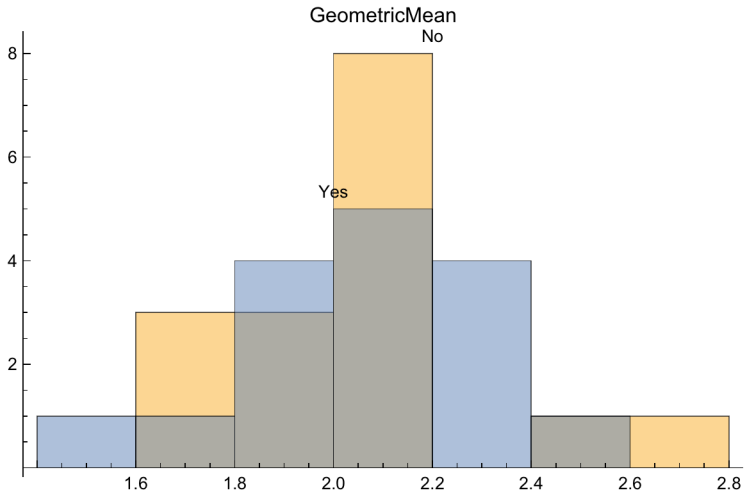
In[59]:=
```
Column[Style[featExplore[#], Larger] & /@ stats]
```

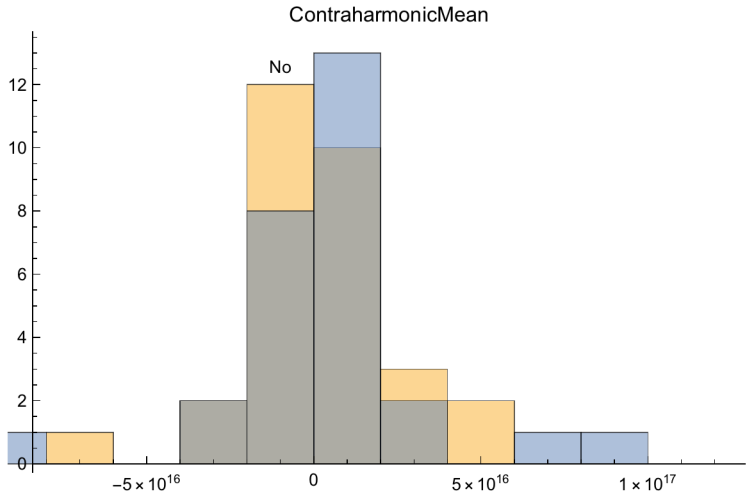


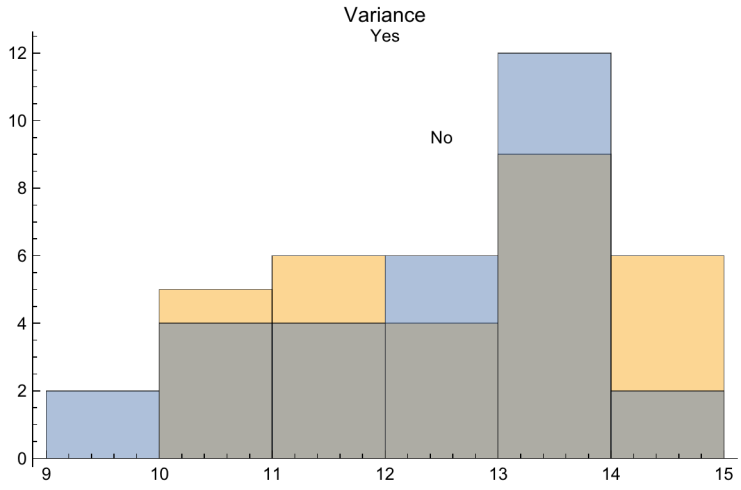

RootMeanSquare
Yes
No
12
10
8
6
4
2
0
3.2
3.4
3.6
3.8
4.0


TrimmedMean
Yes
No
10
8
6
4
2
0
−0.2
−0.1
0.0
0.1

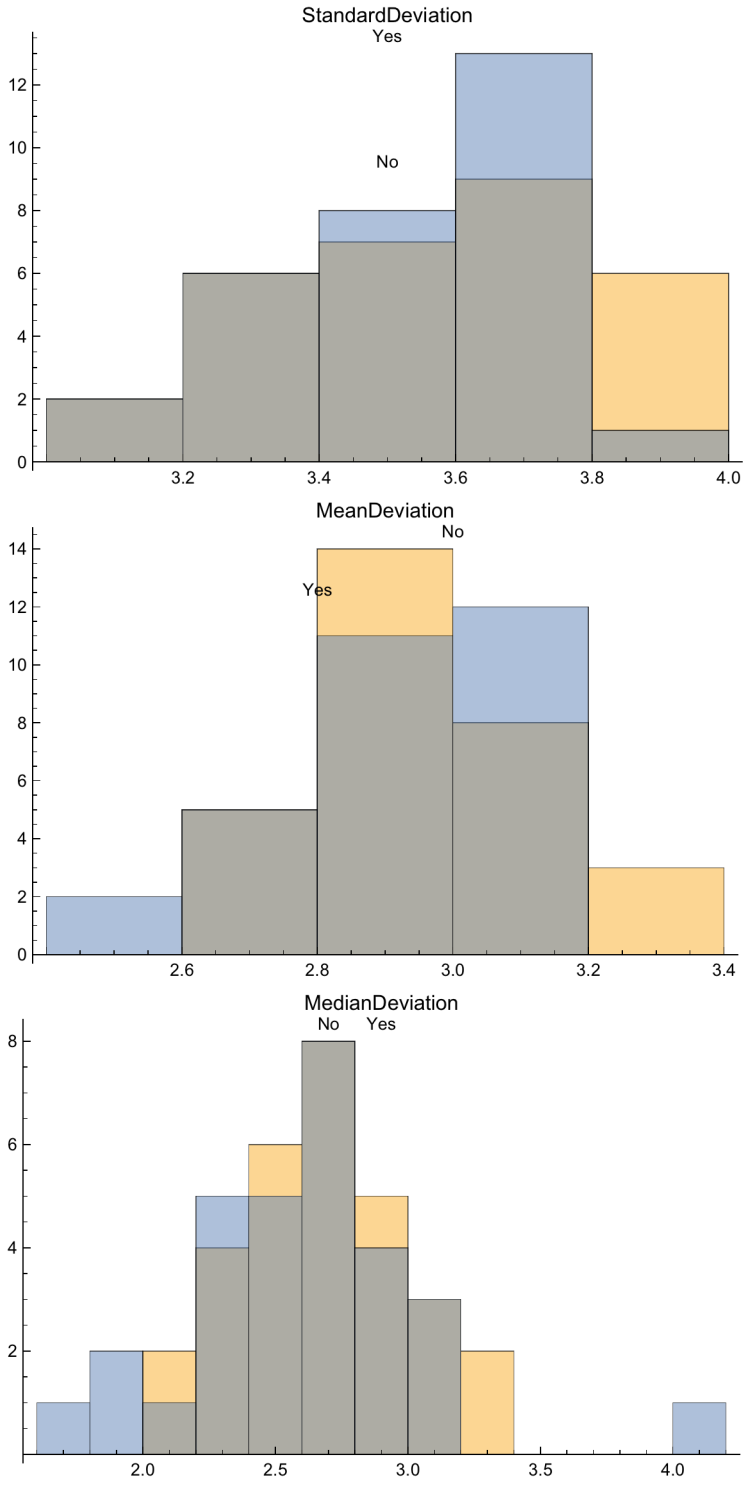

HarmonicMean
No
Yes
10
8
6
4
2
0
−20
−10
0
10
20
30

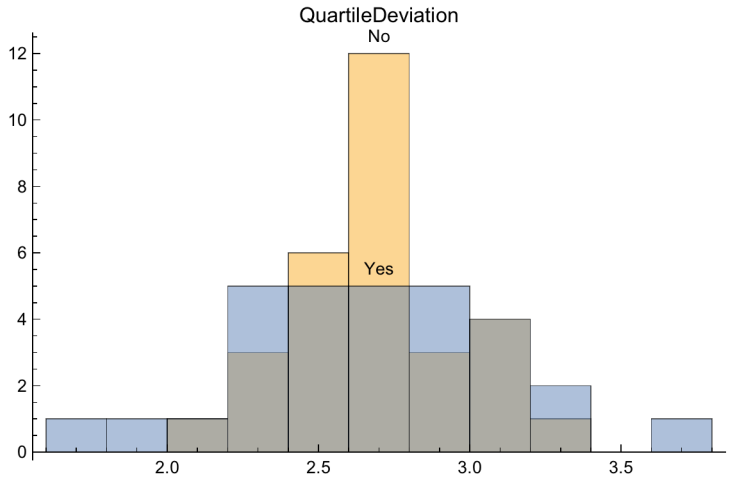

GeometricMean
No
Yes
8
6
4
2
1.6
1.8
2.0
2.2
2.4
2.6
2.8

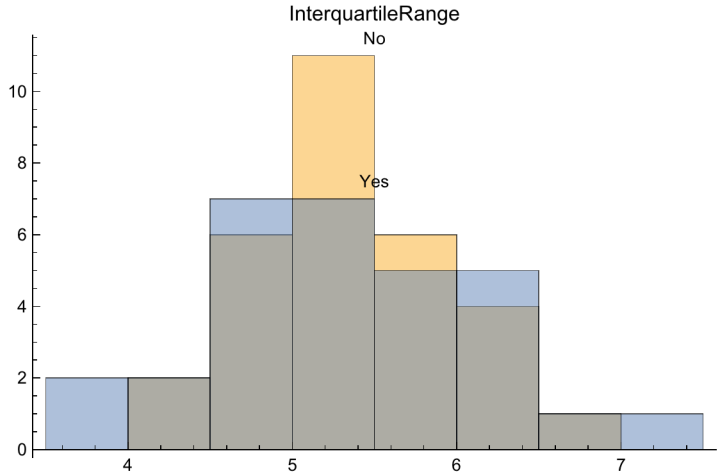

ContraharmonicMean
No
12
10
8
6
4
2
0
−5 × 10^16
0
5 × 10^16
1 × 10^17

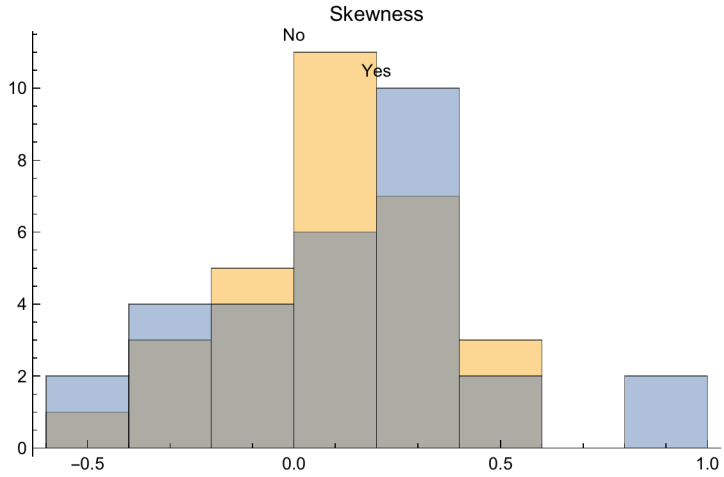

Variance
Yes
No
12
10
8
6
4
2
0
9
10
11
12
13
14
15

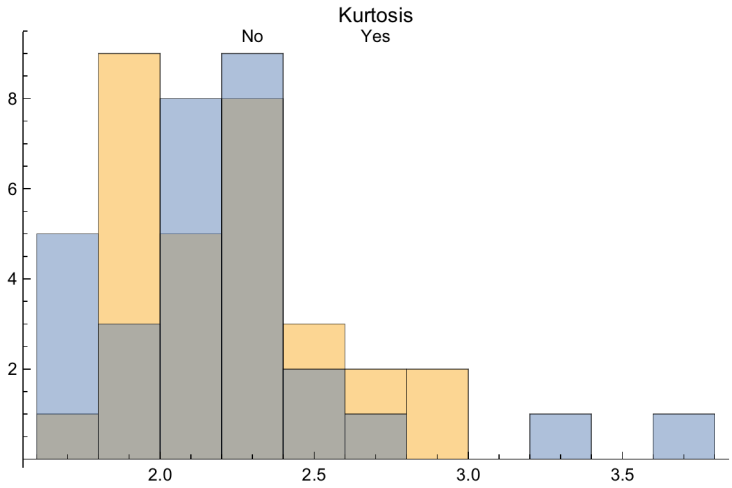
Out[59]=

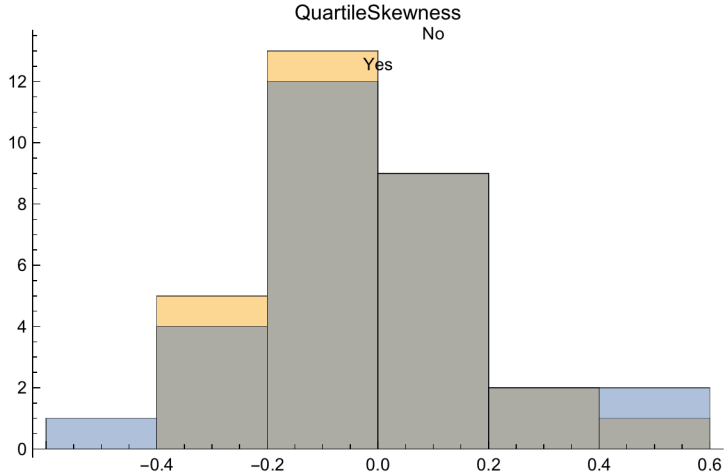

StandardDeviation
Yes
No
0
2
4
6
8
10
12
3.2
3.4
3.6
3.8
4.0
MeanDeviation
No
Yes
0
2
4
6
8
10
12
14
2.6
2.8
3.0
3.2
3.4
MedianDeviation
No
Yes
2
4
6
8
2.0
2.5
3.0
3.5
4.0

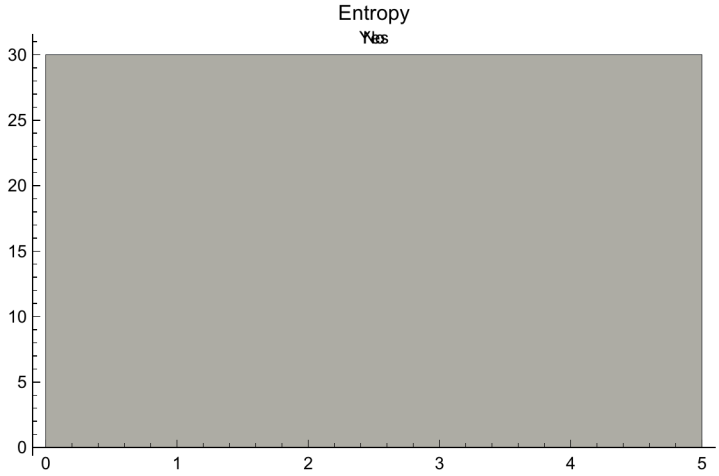

QuartileDeviation
No
Yes
12
10
8
6
4
2
0
2.0
2.5
3.0
3.5

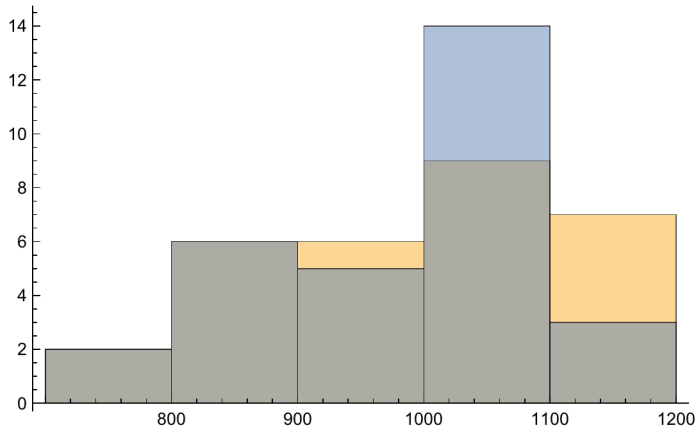

InterquartileRange
No
Yes
10
8
6
4
2
0
4
5
6
7


Skewness
No
Yes
10
8
6
4
2
0
−0.5
0.0
0.5
1.0


Kurtosis
No
Yes
8
6
4
2
2.0
2.5
3.0
3.5


QuartileSkewness
No
Yes
12
10
8
6
4
2
0
−0.4
−0.2
0.0
0.2
0.4
0.6

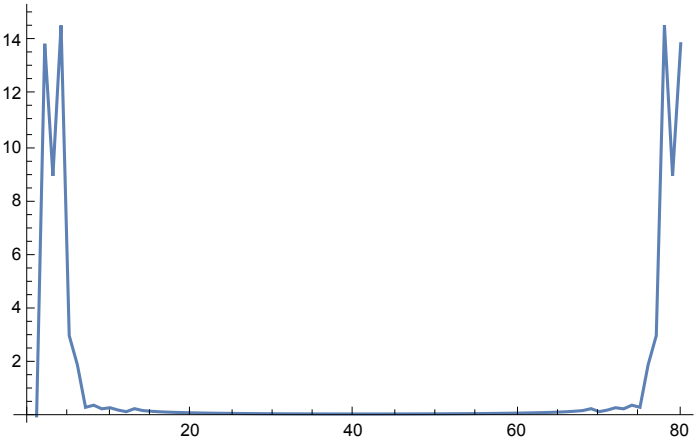

Entropy
30
25
20
15
10
5
0
0
1
2
3
4
5




## Frequency Transforms

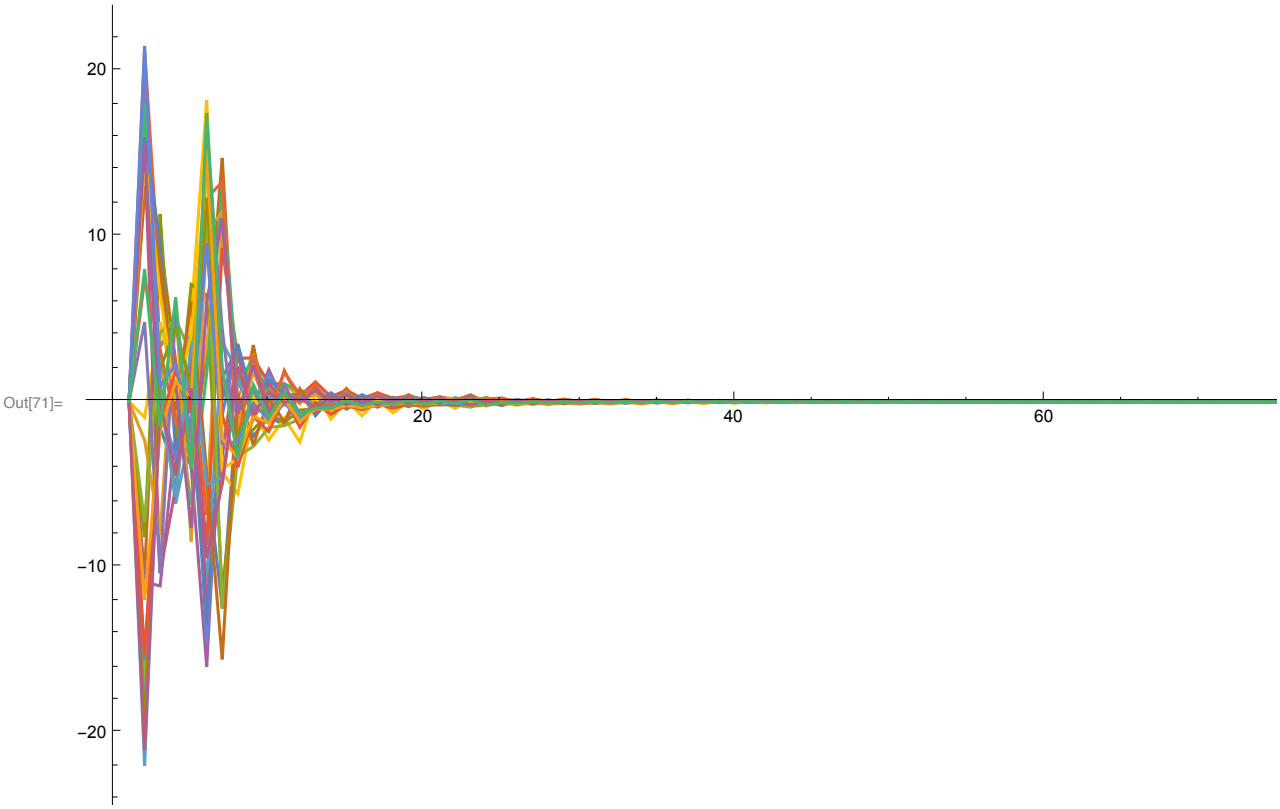
In[60]:=
```
ListLinePlot[Abs[Fourier[reducedOxyYes80[[1, 1]] ]], PlotRange -> All]
```

Out[60]=



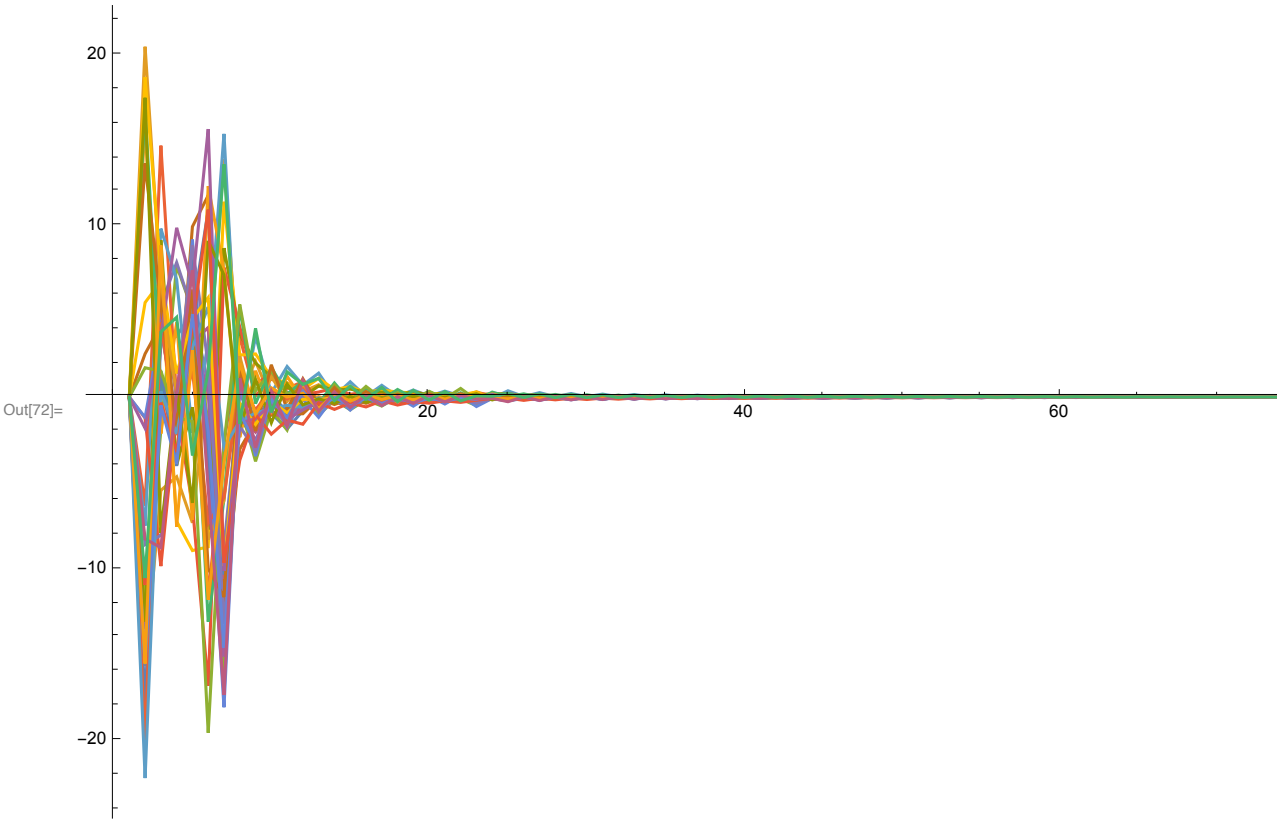
In[71]:=
```
ListLinePlot[
 Table[FourierDCT[reducedOxyNo80[[x, 1]] ], {x, 30}], PlotRange → Full]
```

Out[71]=




In[72]:=
```
ListLinePlot[
 Table[FourierDCT[reducedOxyYes80[[x, 1]] ], {x, 30}], PlotRange → Full]
```

Out[72]=

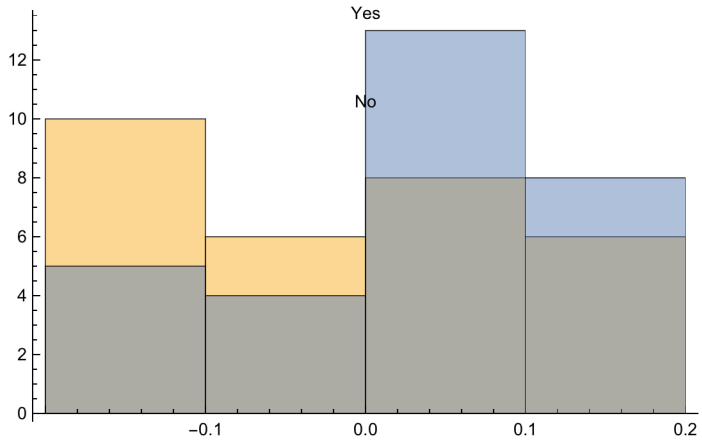


## Linear Interpolation Coefficient on First PCA element

```
getSlope[line_] := ∂var (line)
slopeNo =
  Table[getSlope[Fit[reducedOxyNo80[[x, 1]], {1, var}, var]], {x, 30}];
slopeYes = Table[getSlope[Fit[reducedOxyYes80[[x, 1]], {1, var}, var]], {x, 30}];
```

In[168]:=
```
Histogram[{slopeNo, slopeYes}, ChartLabels → Placed[{"No", "Yes"}, Above]]
```

Out[168]=



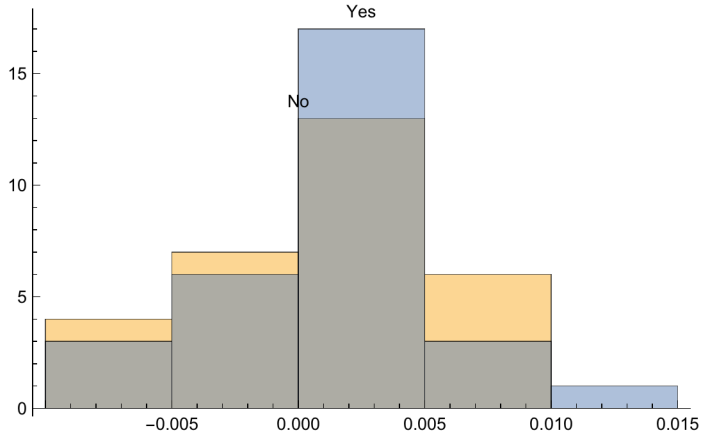

## Quadratic Interpolation Coefficient on First PCA element

In[155]:=
```
getSecondSlope[line_] := ∂var (∂var (line))
```

In[157]:=
```
secondSlopeNo = Table[
    getSecondSlope[Fit[reducedOxyNo80[[x, 1]], {1, var, var^2}, var]], {x, 30}];
secondSlopeYes = Table[getSecondSlope[
     Fit[reducedOxyYes80[[x, 1]], {1, var, var^2}, var]], {x, 30}];
```

In[173]:=
```
Histogram[{secondSlopeNo, secondSlopeYes},
 ChartLabels → Placed[{"No", "Yes"}, Above]]
```

Out[173]=

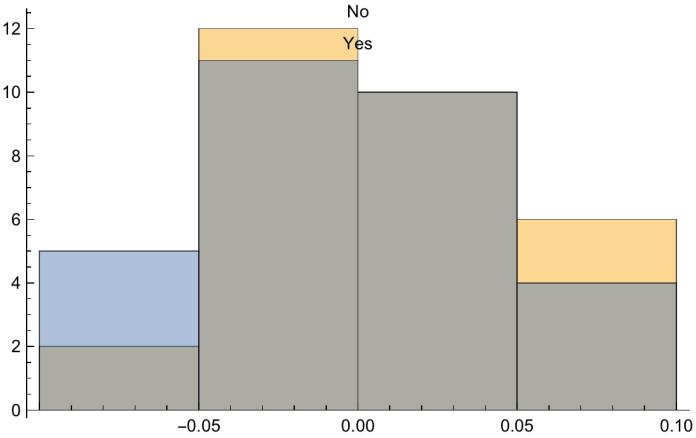


## Linear Interpolation Coefficient on Second PCA element

In[161]:=
```
slopeNoComp2 =
  Table[getSlope[Fit[reducedOxyNo80[[x, 2]], {1, var}, var]], {x, 30}];
slopeYesComp2 = Table[getSlope[Fit[reducedOxyYes80[[x, 2]], {1, var}, var]],
   {x, 30}];
```

In[172]:=
```
Histogram[{slopeNoComp2, slopeYesComp2},
 ChartLabels → Placed[{"No", "Yes"}, Above]]
```

Out[172]=




In[169]:=
```
secondSlopeNoComp2 = Table[
   getSecondSlope[Fit[reducedOxyNo80[[x, 2]], {1, var, var^2}, var]], {x, 30}];
secondSlopeYesComp2 = Table[getSecondSlope[
    Fit[reducedOxyYes80[[x, 2]], {1, var, var^2}, var]], {x, 30}];
Histogram[{secondSlopeNoComp2, secondSlopeYesComp2},
 ChartLabels → Placed[{"No", "Yes"}, Above]]
```

Out[171]=