Create a few high dimensional vectors

In[145]:=
```
uniform = RandomVariate[UniformDistribution[{-2, 2}], {3, 5}];
uniform // MatrixForm
```

Out[146]//MatrixForm=

$$\begin{pmatrix} 0.393194 & 0.698077 & -1.06066 & 0.109935 & 1.01358 \\ -1.11863 & 0.832237 & 1.18703 & -0.71317 & -0.141633 \\ 0.0626771 & -1.75467 & 1.58972 & -0.0741006 & 0.187967 \end{pmatrix}$$

Create Random Projections using a Standard Normal Distribution

In[147]:=
```
projections = RandomVariate[NormalDistribution[], {5, 2}];
projections // MatrixForm
```

Out[148]//MatrixForm=

$$\begin{pmatrix} -0.432416 & 0.983777 \\ -0.0906879 & -0.938208 \\ 0.949504 & -1.04985 \\ -0.230548 & -1.09595 \\ -0.506241 & 0.741747 \end{pmatrix}$$

Find the dot product of the high dimensional vectors with the Random Projections

In[149]:=
```
dotProduct = Dot[uniform, projections];
MatrixForm[dotProduct]
```

Out[150]//MatrixForm=

$$\begin{pmatrix} -1.77889 & 1.47674 \\ 1.77145 & -2.45096 \\ 1.5634 & 0.259573 \end{pmatrix}$$

Check for signs

In[151]:=
```
checks = If[# > 0, 1, 0] & /@ # & /@ dotProduct;
MatrixForm@checks
```

Out[152]//MatrixForm=

$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \\ 1 & 1 \end{pmatrix}$$

Check which rows have the same hash

In[153]:=
```
{#[[1]] == #[[2]], #[[2]] == #[[3]], #[[1]] == #[[3]]} &[checks]
```

Out[153]=
```
{False, False, False}
```

Repeat the checks for a 10000 random projections

In[154]:=
```
Reverse@Sort@Counts[{#[[1]] == #[[2]], #[[2]] == #[[3]], #[[1]] == #[[3]]} & /@
    Table[projections = RandomVariate[NormalDistribution[], {5, 2}];
     If[# > 0, 1, 0] & /@ # & /@ Dot[uniform, projections], 10000]]
```

Out[154]=
```
⟨|{False, False, False} → 5249, {False, True, False} → 2793,
 {True, False, False} → 1257, {False, False, True} → 645, {True, True, True} → 56|⟩
```