Create a few high dimensional vectors

In[21]:=
```
uniform = RandomVariate[UniformDistribution[{0, 1}], {3, 5}];
uniform // MatrixForm
```

Out[22]//MatrixForm=

$$\begin{pmatrix} 0.339376 & 0.992871 & 0.634699 & 0.864846 & 0.0799245 \\ 0.721008 & 0.343454 & 0.612244 & 0.0320199 & 0.737798 \\ 0.474093 & 0.274072 & 0.575318 & 0.096945 & 0.0961586 \end{pmatrix}$$

Create Random Projections using a Standard Normal Distribution

In[23]:=
```
projections = RandomVariate[NormalDistribution[], {5, 2}];
projections // MatrixForm
```

Out[24]//MatrixForm=

$$\begin{pmatrix} 0.0564102 & -0.0775568 \\ 0.49058 & -0.294426 \\ -0.439769 & -0.071729 \\ -0.602688 & 0.365552 \\ -0.422645 & -1.77969 \end{pmatrix}$$

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

In[25]:=
```
dotProduct = Dot[uniform, projections];
MatrixForm[dotProduct]
```

Out[26]//MatrixForm=

$$\begin{pmatrix} -0.327907 & -0.190269 \\ -0.391207 & -1.5023 \\ -0.190878 & -0.294424 \end{pmatrix}$$

Check for signs

In[27]:=
```
checks = If[# > 0, 1, 0] & /@ # & /@ dotProduct;
MatrixForm@checks
```

Out[28]//MatrixForm=

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

Check which rows have the same hash

In[29]:=
```
{#[[1]] == #[[2]], #[[2]] == #[[3]], #[[1]] == #[[3]]} &[checks]
```

Out[29]=
```
{True, True, True}
```

Repeat the checks for a 10000 random projections

In[30]:=
```
Reverse@Sort@Counts[{#[[1]] == #[[2]], #[[2]] == #[[3]], #[[1]] == #[[3]]} & /@
    Table[projections = RandomVariate[NormalDistribution[], {5, 2}];
     If[# > 0, 1, 0] & /@ # & /@ Dot[uniform, projections], 10000]]
```

Out[30]=
```
⟨|{True, True, True} → 4152, {False, True, False} → 2683,
 {False, False, True} → 1698, {False, False, False} → 745, {True, False, False} → 722|⟩
```