# DT_proof

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## An incoherent, Dutch Book series of bets:

```
## [1] 0.3 0.1 0.4
```

The set of probabilities do not meet the criterion

```
## [1] 0.8
```

In matrix form:

```
##       [,1] [,2] [,3]
## [1,]  0.7 -0.3 -0.3
## [2,] -0.1  0.9 -0.1
## [3,] -0.4 -0.4  0.6
```

Notice matrix determinant > 0:

```
## [1] 0.2
```

and that we can invert the matrix

```
##       [,1] [,2] [,3]
## [1,]  2.5  1.5  1.5
## [2,]  0.5  1.5  0.5
## [3,]  2.0  2.0  3.0
```

Here we give some arbitrary numerical stakes to each event with probability:

```
## [1] 5 2 1
```

Accordingly, if we solve for the system of linear equations, the gains for each bet equal:

```
## [1]  2.6  1.2 -2.2
```

Notice the sum have positive gains of 2:

```
## [1] 2
```

Because this series of bets is inconsistent, we can solve for s again:

```
## [1] 5 2 1
```

and this will work for any arbitrary size of stakes (bets):

```
## [1] 20291   213 13512
```

Accordingly, if we solve for the system of linear equations, the gains for each bet equal:

```
## [1] 10086.2 -3188.6   -94.4
```

Again, notice the sum have positive gains:

```
## [1] 6803
```

# A coherent series of bets:

```
## [1] 0.3 0.3 0.4
```

The set of probabilities do meet the criterion

```
## [1] 1
```

In matrix form:

```
##      [,1] [,2] [,3]
## [1,]  0.7 -0.3 -0.3
## [2,] -0.3  0.7 -0.3
## [3,] -0.4 -0.4  0.6
```

Notice matrix determinant is 0:

```
## [1] -6.661338e-17
```

and we cannot invert the matrix

```
## [1] TRUE
```

Here we give assign numerical stakes to each event with probability pn:

```
## [1] 5 2 1
```

Accordingly, if we solve for the system of linear equations, the gains for each bet equal (we even have to revert to the %*% matrix operator)

```
##      [,1]
## [1,]  2.6
## [2,] -0.4
## [3,] -2.2
```

Notice the net overall gains are 0:

```
## [1] 0
```

... but we cannot solve "for s = R^-1 * g"

This will always result in a net gain of 0 for any arbitrary size of stakes (bets):

```
## [1] 20291    213 13512
```

Accordingly, if we solve for the system of linear equations, the gains for each bet equal:

```
##          [,1]
## [1,] 10086.2
## [2,] -9991.8
## [3,]   -94.4
```

Again, notice the net overall gains are 0:

```
## [1] 0
```