J Book

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1 Item Associations

1. d = data. Rows: baskets, columns: products, where 1=product in basket
2. pb = % baskets containing each product
3. ep = Expected % baskets containing each pair of products
4. ap = actual % baskets containing each pair of products
5. Calculate lift: ap/ep

```
   nn=:4
   ]< d=:(,~nn)$ ?2#~ *~nn
┌───────┐
│1 1 0 1│
│0 1 1 0│
│0 1 1 1│
│0 1 1 0│
└───────┘
   ]pb=:(+/ % #)"2 d
0.25 1 0.75 0.5
   ]<ep=:(pb * =/~ i.nn) >. pb *"0 1 pb
┌─────────────────────────┐
│  0.25 0.25 0.1875 0.125│
│  0.25    1   0.75   0.5│
│0.1875 0.75   0.75 0.375│
│ 0.125  0.5  0.375   0.5│
└─────────────────────────┘
   ]<ap=:>{{(+/ % #) */"1 y {"1 _1 d}} each { ;~ i.nn
┌────────────────────┐
│0.25 0.25    0 0.25│
│0.25    1 0.75  0.5│
│   0 0.75 0.75 0.25│
│0.25  0.5 0.25  0.5│
└────────────────────┘
   ]<lift=:ap%ep
┌──────────────────────┐
│1 1        0        2│
│1 1        1        1│
│0 1        1 0.666667│
│2 1 0.666667        1│
└──────────────────────┘
```

2 Demand Fill Optimisation

1. xo = Options
2. xs = Random selection from options (xo)
3. xp = Problem to solve, which is the column sum of xs
4. Solve it. Solve knowing only xp and xo. Being blind to xs

Think of each column as a product and each row as an option for how much of each product. Thinking possible pallet configurations or possible cattle carcasse breakdowns makes these options more understandable.

```
   nn=:4
   ]<xo=:8* (] % +/"1) (,~nn) $ ?2#~*~nn
┌──────────────────────────┐
│2.66667 2.66667 0 2.66667│
│      4       4 0       0│
│      2       2 2       2│
│      0       0 4       4│
└──────────────────────────┘
   ]<xs=:xo {~ ?3#nn
┌───────┐
│2 2 2 2│
│2 2 2 2│
│2 2 2 2│
└───────┘
   ]xp=:+/"2 xs
6 6 6 6
   xt=:(xo,0) {~ ?20#nn NB. rando solve incl all 0 option
   eval=:3 : '+/ | xp - +/"2 y'
   bs=:3 : '(}:xt) ,~ (xo,0){~ (] i. <./) {{eval y, }: xt}}"1 xo, 0'
NB. best solve
   solver=: 3 : 0
xt=:bs 1
eval xt
)
   solver"0 i.25
128 120 112 104 96 88 80 72 64 56 48 40 32 24 16 13.3333 8 4 4 0 0 0 0
0 0
   ]<xt=:xt {~ I. 0< +/"1 xt
┌───────┐
│2 2 2 2│
│0 0 4 4│
│4 4 0 0│
└───────┘
```