Monday, May 4, 2020 5:11 PM

1 Variable, P

P
T
F

Number of choices: 2^1=2

2 variables, P & Q

P	Q
T	T
T	F
F	T
F	F

Lets look at the punnent square:

P is T	P is F	
T T	F T	Q is T
T F	FF	Q is F

This is two different ways to display the four possible outcomes
I color coded them so you can see these.

Number of choices: 2^2=4

3 Varibales, x,y,z

X	y	z
T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	T
F	F	F

Another way to organize this is to put the values into ordered triples
Then look at all the combinations of possible outcomes;
I will express these in triples like this: (x,y,z)
So the first ordered triple will be (T,T,T)

To find all the rest we will want to be systematic, so we will start with all T's, Then change
To false in order one at a time.
(T,T,T)
(T,T,F) That is all the combinations when both x,y are T.
Next lets let x be T but y be F
(T,F,T)
(T,F,F) That is all the possiblities with x =T and y =F
Now lets let x=F and repeat the process.
(F,T,T)
(F,T,F)
Now x=F, Y=F let z change
(F,F,T)
(F,F,F)
We have now run through all possibe combinations for those three variables if they only have two options.

Number of choices: 2^3=8

Another way to imagine this is that we will just use two punnent squares.
One for when x=T and another for when x=F

When x=T		
y=T	y=F	
T T	F T	z=T
T F	F F	z=F

Which means when x=T we have 4 possible choices
They are
(T,T,T)
(T,T,F)
(T,F,T)
(T,F,F)

When x=F		
y=T	y=F	
T T	F T	z=T
T F	F F	z=F

Which means when x=T we have 4 possible choices
They are
(F,T,T)
(F,T,F)
(T,F,T)
(T,F,F)

Again as you can see we have 2^3=8 possible choices.

This pattern will continue: if there are 4 variables we have 2^4 possible choices.

(T,T,T,T)
(T,T,T,F)

(T,T,F,T)
(T,T,F,F)

(T,F,T,T)
(T,F,T,F)
&
(T,F,F,T)
(T,F,F,F)

Now we repeat these 8 combos but let the first variable be F
(F,T,T,T)
(F,T,T,F)

(F,T,F,T)
(F,T,F,F)

(F,F,T,T)
(F,F,T,F)
&
(F,F,F,T)
(F,F,F,F)

Each time you add another variable you double the number of possible choices. And so on. If you look at them side by side the pattern will look more clear.

1 variable

T
F

2 variables

T	T
T	F
F	T
F	F

3 variables

T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	T
F	F	F

4 Variables

T	T	T	T
T	T	T	F
T	T	F	T
T	T	F	F
T	F	T	T
T	F	T	F
T	F	F	T
T	F	F	F
F	T	T	T
F	T	T	F
F	T	F	T
F	T	F	F
F	F	T	T
F	F	T	F
F	F	F	T
F	F	F	F

And so on...