

Alternative to Venn Diagram

4 Variables :

n	Union - U				Intersection - n
D	AD	BD	CD	D	
C	AC	BC	BCD	ACD	
B	AB	ABC	ABD		
A	A	X	X	X	
	A	B	C	D	

Where

X = Don't Care, AB = AnB, AC = AnC, AD = AnD, BC = BnC, BD = BnD, CD = CnD
 ABC = AnBnC, ABD = AnBnD, ACD = AnCnD, BCD = BnCnD

Formula:

$$n(AuBuCuD) = [n(A)+n(B)+n(C)+n(D)] - [n(AnB)+n(AnC)+n(AnD)+n(BnC)+n(BnD)+n(CnD)] + [n(AnBnC)+n(AnBnD)+n(AnCnD)+n(BnCnD)] - [n(AnBnCnD)]$$

Example :

Given : A={1,2,3,4}, B={2,3,4,5}, C={3,4,5,6}, D={4,5,6,7}, n(AuBuCuD)=?

Set Elements	No. of Elements(n)
A = {1,2,3,4}	4
B = {2,3,4,5}	4
C = {3,4,5,6}	4
D = {4,5,6,7}	4
AB = {2,3,4}	3
AC = {3,4}	2
AD = {4}	1
BC = {3,4,5}	3
BD = {4,5}	2
CD = {4,5,6}	3
ABC = {3,4}	2
ABD = {4}	1
ACD = {4}	1
BCD = {4,5}	2
ABCD = {4}	1
$AuBuCuD = [4+4+4+4] - [3+2+1+3+2+3] + [2+1+1+2] - 1$ $= 16 - 14 + 6 - 1$ $AuBuCuD = \{1,2,3,4,5,6,7\}$	7

How to Fill it :

n	$AuBuCuD = \{1,2,3,4,5,6,7\}$				
D	$AD = \{4\}$	$BD = \{4,5\}$	$CD = \{4,5,6\}$	$D = \{4,5,6,7\}$	$AnBnCnD = \{4\}$
C	$AC = \{3,4\}$	$BC = \{3,4,5\}$	$C = \{3,4,5,6\}$	$BCD = \{4,5\}$ $ACD = \{4\}$	
B	$AB = \{2,3,4\}$	$B = \{2,3,4,5\}$	$ABC = \{3,4\}$	$ABD = \{4\}$	
A	$A = \{1,2,3,4\}$	X	X	X	
	A	B	C	D	

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