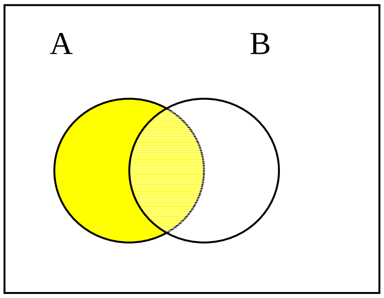
Discrete Mathematics – Day 41 – December 10, 2003

Show that $(A\cap B) \cup (A\cap \overline{B}) = A$



Note A consists of those elements in A and B, plus those elements in A but not in B.

Membership Tables (like truth tables):
1= in set
0= not in set

A	B	A∩B	A∪B	A⊕B	A-B	A
1	1	1	1	0	0	0
1	0	0	1	1	1	0
0	1	0	1	1	0	1
0	0	0	0	0	0	1

A	B	A∩B	B (comp)	A∩B(comp)	(A∩B)∪(A∩B(comp))
1	1	1	0	0	1
1	0	0	1	1	1
0	1	0	0	0	0
0	0	0	1	0	0

(U-A)-B = comp of (A∪B)

A	B	U	(U-A)	(U-A)-B	A∪B	Comp(A∪B)
1	1	1	0	0	1	0
1	0	1	0	0	1	0
0	1	1	1	0	1	0
0	0	1	1	1	0	1

Need to know Moden Podens

$(A \oplus B) \oplus C = A \oplus (B \oplus C)$

A	B	C	A⊕B	(A⊕B) ⊕C	B⊕C	A⊕(B⊕C)
1	1	1	0	1	0	1
1	1	0	0	0	1	0
1	0	1	1	0	1	0
1	0	0	1	1	0	1
0	1	1	1	0	0	0
0	1	0	1	1	1	1
0	0	1	0	1	1	1
0	0	0	0	0	0	0

$n \rightarrow$ integer $\rightarrow n^2$ ends with 1, 4, 5, 6, or 0
$n = 1762 \times 10 + 2$

Where $b \in \{0, 1, 2, \dots, 9\}$
Then $n^2 = (10a + b)^2$
$100a^2 + 10ab + b^2$
$= 10(10a^2 + ab) + b^2$
This means the last digit of n^2 is the same as the last digit of b^2

B	B^2	Last digit
0	0	0
1	1	1
2	4	4
3	9	9
4	16	6
5	25	5
6	36	6
7	49	9
8	64	4
9	81	1

*Corollary: $\sqrt{137657}$ is not an integer.