

MATH 017 Sections 006 and 007
Spring 2007
Quiz 3

1. If $n(A) = 27$, $n(B) = 35$, and $n(A \cap B) = 21$; what is $n(A \cup B)$?

Applying the union rule, we get $27 + 35 - 21 = 41$.

2. Suppose a set A has 5 elements. How many subsets of A are there that contain at least one element of, but not all five elements of A ?

The subsets we want are from all the possible subsets of A (of which there are 32) but exclude the empty set and the entire set A . Hence, excluding those two leaves us with $32 - 2 = 30$.

3. The table below shows the (hypothetical) results of a campus poll taken in which people of different majors are asked where they intend to reside during the next academic year.

	Visual Arts (A)	Natural Sciences (B)	Social Sciences (C)	Performing Arts (E)	Liberal Arts (F)	
Dorms (D)	237	112	86	140	16	591
Apartments (P)	241	64	32	175	5	517
Houses (H)	25	23	12	15	17	92
Totals	503	199	130	330	38	1200

Find the number of people in the set $D \cap (E \cup H)$.

The people in $D \cap (E \cup H)$ are the people who live in dorms AND either live in houses or are performing arts majors. By the distribution law, this reduces to the people who live in dorms and live in houses OR live in dorms and are performing arts majors. The question implicitly assumes that a person only lives in one type of accommodation. It follows that no people live in dorms and houses. We are now left with the people who live in dorms and are performing arts majors. Reading this number off the table, we get 140.

4. A card is drawn from a well-shuffled standard deck of 52 playing cards. What is the probability of obtaining a card that is a queen and a heart?

There is exactly one card of all fifty-two that is a queen and a heart: the queen of hearts. Hence the chances of getting a card that is a queen and a heart is $\frac{1}{52}$.

5. Among 180 households surveyed, 59 have a rifle, 45 have a pickup truck, 31 have a guard dog, 9 have a rifle and a pickup truck, 8 have a pickup truck and a guard dog, and 5 have all three. What is the probability that a household will have a pickup truck and a rifle but not a guard dog?

We know from the data that 9 households have a pickup truck and a rifle. Of those, we have that 5 have a pickup truck, rifle, and guard dog. It

follows that the remainder in 9, $9 - 5 = 4$ have pickup trucks and rifles but do not have guard dogs. Hence the chances of a household having a pickup truck and rifle but not a guard dog is 4 in 180, or $\frac{1}{45}$.