

Example 4 A survey conducted by the Bureau of Labor Statistics found that 68% of the high school graduating class of 2010 went on to college the following year, while 42% of the class was working. Furthermore, 92% were either in college or working, or both.

- (a) What percentage went on to college and work at the same time?
 (b) What percentage went on to college but not work?

(a) A : A graduate went on to college, $P(A) = .68$

B : A graduate went on to work, $P(B) = .42$

$A \cup B$: college, work, or both, $P(A \cup B) = .92$

Want $P(A \cap B)$.

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$.92 = .68 + .42 - P(A \cap B)$$

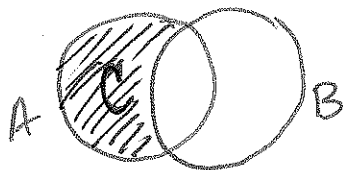
$$.92 = 1.1 - P(A \cap B)$$

$$-.18 = -P(A \cap B)$$

$$18\% = P(A \cap B)$$

(b) What percentage went on to college but not work?

C : A grad. went on to college but not work.



$$P(A) - P(A \cap B) = P(C)$$

$$.68 - .18 = P(C)$$

$$.50 = P(C)$$

$$50\%$$

Principles of Probability Distributions The following rules hold for any sample space S and any event A :

$$P(S) = 1$$

$$P(\emptyset) = 0$$

$$P(A') = 1 - P(A)$$

Example 5 A home loan is either current, 30-59 days past due, 60-89 days past due, 90 or more days past due, in foreclosure, or repossessed by the lender. In November 2008, the probability that a randomly selected subprime home mortgage in California was not current was .51. The probability that a mortgage was not current, but neither in foreclosure nor repossessed, was .28. Calculate the probabilities of the following events.

(a) A California home mortgage was current.

(b) A California home mortgage was in foreclosure or repossessed.

(a) A : mortgage current = C'

C : not current, $P(C) = .51$

$$P(C') = 1 - P(C) = 1 - .51 = .49$$

(b) F : foreclosure or repossessed

H : neither current, in foreclosure, nor repossessed

$$P(H) = .28$$

$$P(C) = P(F) + P(H)$$

$$.51 = P(F) + .28$$

$$P(F) = .23$$

Example 6 According to a *New York Times*/CBS poll, ^A45% agreed that Social Security taxes should be raised if necessary to keep the system afloat, and 35% agreed that it would be a good idea to invest part of their Social Security taxes on their own. ^B

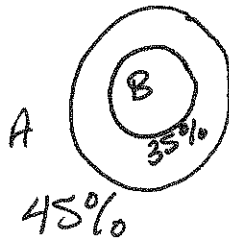
- (a) What is the largest percentage of people who could have agreed with at least one of these statements?
 (b) What is the smallest percentage of people who could have agreed with at least one of these statements?

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$.45 + .35 - 0$$

(a) Largest percentage happens
 when $A \cap B = \emptyset$
 $.45 + .35 = 80\%$

(b)



$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= .45 + .35 - .35$$

$$= 45\%$$