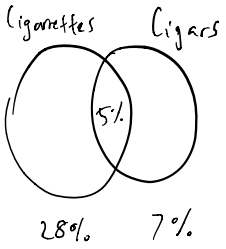
2. a.) 28% of American men smoke cigarettes

7% smoke cigars

5% smoke both cigars and cigarettes



subtracting 5 eliminates any shared population

⇓

then we can say either/or

$(28\% + 7\%) - (5\%) = (35\%) - (5\%) = 30\%$ of American men smoke either cigarettes or cigars

$100\% - 30\% =$ **70% of American men smoke neither**

b.) 7% smoke cigars

5% smoke both cigars & cigarettes

$7\% - 5\% =$ **2% smoke cigars but not cigarettes**

3. Any person has prob. of 0.42 that his/her ancestor belonged to certain tribe

Blood test system = 90% accuracy ⇒ Negative result

Bayes Rule: X and Y are discrete Random Variables

$$P(X = x \mid Y = y) = \frac{P(X = x \cap Y = y)}{P(Y = y)}$$

$$P(X = 0.42 \mid Y = 0.9) = \frac{P(0.42 \cap 0.9)}{P(0.9)}$$

Prob. that you actually descend from that tribe given a blood test system that you do not

$$\frac{(0.42)(0.9)}{(0.42)(0.9)+(0.58)(0.1)} = 0.86697$$

Bayes Theorem: $P(A|B) = \frac{P(A)P(B|A)}{P(B)}$ $\quad P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$

A = prob that ancestors belonged to tribe

B = prob that we get a positive on test

	D	ND	
+	(0.42)(0.9) 0.378	(0.58)(0.1) 0.058	0.436 (sum)
−	(0.42)(0.1) 0.042	(0.58)(0.9) 0.522	0.564 (sum)
	0.42	0.58	

tested negative

and (union)

$$P(D|-) = \frac{P(D \cap -)}{P(-)} = \frac{0.042}{0.564}$$

$$= 0.074468$$