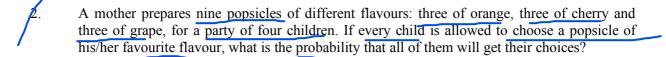
CX2100 Prob & Stat

Tutorial #2

Probability

- 1. A jar contains four coins: a nickel (5ϕ) , a dime (10ϕ) , a quarter (25ϕ) , and a half-dollar (50ϕ) . Three coins are randomly selected without replacement from the jar.
 - (a) List all the possible outcomes in sample space S.
 - (b) What is the probability that the total amount drawn will equal 60¢ or more?



When two events are mutually exclusive, they cannot both happen when the experiment is performed. Once event B has occurred, event A cannot occur, i.e. P(A|B) = 0 or $P(A \cap B) = 0$, and vice versa. The occurrence of event B certainly affects the probability of occurrence of event A. Therefore, mutually exclusive events must be dependent.

When two events are independent, the occurrence of event B does not affect the probability of occurrence of event A, i.e. P(A|B) = P(A) or $P(A \cap B) = P(A)P(B)$, and vice versa. Event A may still occur even if event B has occurred. Therefore, independent events cannot be mutually exclusive.

Use the relationships above to fill in the table below:

P(A)	P(B)	Conditions	P(A B)	P(A∩B)	P(AUB)
0.3	0.4	mutually exclusive	0	0	0.7
0.3	0.4	independent	0.3	0.7	0.78
0.1	0.5	mutually exclusive	0	, D	0.6
0.2	0.5	independent	0.5	0.1	0.6

4. A blood disease is found in 2% of the persons in a certain population. A new blood test will correctly identify 96% of the persons with the disease and 94% of the persons without the disease.

- What is the probability that a person who is called positive by the blood test actually has the disease?
- What is the probability that a person who is called negative by the blood test actually does not have the disease?
- Comment on the results obtained in part (a) & (b).

A magician has in his pocket a fair coin and a doctored coin where both sides are heads. If he randomly picks a coin to flip, and obtains a head, what is the probability that he picks the fair coin?

If he flips the same coin the second time and obtains a head again, what is the probability that it is a fair coin?

Answers

- 1. (b) $\frac{3}{4}$
- 2. $\frac{26}{27}$

3.

P(A)	P(B)	Conditions	P(A B)	$P(A \cap B)$	P(AUB)
0.3	0.4	mutually exclusive	0	0	0.7
0.3	0.4	independent	0.3	0.12	0.58
0.1	0.5	mutually exclusive	0	0	0.6
0.2	0.5	independent	0.2	0.1	0.6

- 4. (a) 0.246 (b) 0.999
- 5. (a) $\frac{1}{3}$ (b) $\frac{1}{5}$