

- 1) A fair coin is tossed four times. What is the probability that the sequence of tosses is HHHT? 1) A
 A) 0.0625 B) 0.25 C) 0.038 D) 0.125
 $P(\text{Head and Head and Head and Tail}) = P(H) \times P(H) \times P(H) \times P(T) = 1/2 \times 1/2 \times 1/2 \times 1/2 = 1/16 = 0.0625$
- 2) A fair die is rolled two times. What is the probability that both rolls are 6? 2) D
 A) 0.167 B) 0.083 C) 0.0046 D) 0.028
 $P(\text{Rolling a 6 and Rolling another 6}) = P(\text{of 6}) \times P(\text{of 6}) = 1/6 \times 1/6 = 1/36 \Rightarrow 0.027777... = 0.028$
- 3) According to popular belief, 80% of adults enjoy drinking beer. Choose a group of 2 adults at random. The probability that all of them enjoy drinking beer is _____. 3) A
 A) 0.640 B) 0.400 C) 1.600 D) 0.500
 $P(\text{beer drinkers}) = P(\text{one is drinks beer AND the second drinks beer}) = 0.80 \times 0.80 = 0.640$
- 4) Given eight students, three of whom are female, if two students are selected at random, without replacement, what is the probability that both students are female? 4) C
 A) $\frac{5}{14}$ B) $\frac{9}{64}$ C) $\frac{3}{28}$ D) $\frac{25}{28}$
 $P(\text{1st is female and 2nd is female}) = P(\text{1st is fem}) \times P(\text{2nd is female given that 1st is fem}) = 3/8 \times 2/7 = 6/56 \Rightarrow 3/28$
- 5) A fair die is rolled four times. What is the probability that it comes up 3 at least once? 5) A
 A) 0.5177 B) 0.1667 C) 0.8333 D) 0.4213
Rule $P(\text{at least one } \underline{\quad}) = 1 - P(\text{none of } \underline{\quad})$: $P(\text{at least one } \underline{3}) = 1 - P(\text{none of them are } \underline{3}) = 1 - (5/6)^4 = 0.5177$
- 6) On an eight-question true-false quiz, a student guesses each answer. What is the probability that the student gets at least one of the answers correct? 6) A
 A) $\frac{255}{256}$ B) $\frac{1}{256}$ C) $\frac{7}{8}$ D) $\frac{1}{8}$
P(at least one question correct) = 1 - P(all questions no correct) $\Rightarrow 1 - (1/2)^8 = 255/256$
- 7) Urn 1 contains 4 red balls and 3 black balls. Urn 2 contains 2 red balls and 3 black balls. Urn 3 contains 2 red balls and 6 black balls. If an urn is selected at random and a ball is drawn, find the probability it will be red. 7) D
 A) $\frac{2}{5}$ B) $\frac{1}{3}$ C) $\frac{1}{105}$ D) $\frac{57}{140}$ Answer on next page
- 8) In a second grade class containing 14 girls and 8 boys, 2 students are selected at random to give out the math papers. What is the probability that the second student chosen is a boy, given that the first one was a girl? 8) B
 A) $\frac{4}{11}$ B) $\frac{8}{21}$ C) $\frac{7}{11} \cdot \frac{2}{3}$ D) $\frac{7}{11} \cdot \frac{8}{21}$

P(2nd Student is a boy | 1st is a girl) = 8/21

Notice that if the 1st student selected is a girl, when we go for the 2nd student there are 8 boys available but there is one less student in total (there were 22 in total) since one girl was already chosen.

9) The Gift Basket Store had the following premade gift baskets containing the following combinations in stock. 9) D

	Cookies	Mugs	Candy
coffee	5	18	11
Tea	15	14	7

$$P(\text{Tea}|\text{Mugs}) = \frac{P(\text{Tea AND Mugs})}{P(\text{Mugs})} = \frac{14}{32} = 0.4375$$

Mugs total: 32

Choose 1 basket at random. Find the probability that it contains tea given that it contains mugs.

- A) ≈ 0.563 B) ≈ 0.200 C) ≈ 0.778 D) ≈ 0.438

10) A lot of 1000 components contains 200 that are defective. Two components are drawn at random and tested. Let A be the event that the first component drawn is defective, and let B be the event that the second component drawn is defective. 10) C

Find $P(A \text{ and } B)$.

- A) 0.005 B) 0.1992 C) 0.0398 D) 0.2

$$P(A \text{ and } B) = P(A) \times P(B|A) \Rightarrow P(A \text{ and } B) = 200/1000 \times 199/999 = 0.03983... = 0.0398$$

Question 7 Answer:

Urn1: 4 red & 3 black Urn2: 2 red & 3 black Urn3: 2 red & 6 black

$$P(\text{red}) = P(\text{red}|\text{urn1}) + P(\text{red}|\text{Urn2}) + P(\text{red}|\text{Urn3}) = 1/3 \times 4/7 + 1/3 \times 2/5 + 1/3 \times 2/8 = 57/140$$