

QUIZ 1

Please, write legibly and show your work to get credit.

Problem 1. [4Pts] Let $P(A \cap B) = 0.1$, $P(A) = 0.6$, $P(B) = 0.3$. Justify all your steps **analytically**.

- (a) Find $P(A \cup B)$
- (b) Find $P(A^c \cup B^c)$

Solution.

$$(a) P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.6 + 0.3 - 0.1 = 0.8$$

$$(b) P(A^c \cup B^c) = P((A \cap B)^c) = 1 - P(A \cap B) = 0.9$$

Problems 2. [6Pts] A bowl contains 22 chips, of which 11 are red, 7 are blue and 4 are white. Six chips are drawn at random and without replacement.

- (i) Compute the probability that each of the 6 chips is blue.
- (ii) Compute the probability that 4 chips are red and 2 chips are blue.
- (ii) Compute the probability that there are no blue chips in the draw.

Note: It is sufficient to write the solution in terms of binomial coefficients. You do not need to simplify or find the numerical value.

Solution.

(i)

$$P(6 \text{ blue}) = \frac{\binom{7}{6}}{\binom{22}{6}}$$

(ii)

$$P(4 \text{ red, } 2 \text{ blue}) = \frac{\binom{11}{4} \binom{7}{2}}{\binom{22}{6}}$$

(iii)

$$P(\text{no blue chips}) = 1 - P(6 \text{ blue chips}) = 1 - \frac{\binom{7}{6}}{\binom{22}{6}}$$