Last name _____ First name _____ Score _____/15

EE 503
Quiz 2 Solution
Fall 2019, 15 Minutes, 15 Points

Suppose you are dealt 4 cards randomly from a deck of 40 cards consisting of 10 different face values $\{10, 9, 8, 7, 6, 5, 4, 3, 2, 1\}$ with each face value appearing 4 times with different colors $\{$Black, Red, Yellow, Green$\}$.

For each of your answers below give the expression you used to compute the probability and evaluate this expression to a numerical value. Credit will not be given without the mathematical expression provided.

Problem 1. (9 points.) Find

    a. the probability of a pair (exactly 2 cards of the same face value).

    Solution:
$$P(pair) = \frac{\binom{10}{1}\binom{4}{2}\binom{9}{2}4^2}{\binom{40}{4}} = 0.3782.$$

    b. the probability of two pair (exactly 2 cards of one face value and 2 cards of another face value).

    Solution:
$$P(2\ pair) = \frac{\binom{10}{2}\binom{4}{2}^2}{\binom{40}{4}} = 0.01773.$$

    c. the probability of three of a kind (exactly 3 cards of the same face value and 1 card of another face value).

    Solution:
$$P(3\ of\ a\ kind) = \frac{\binom{10}{1}\binom{4}{3}\binom{9}{1}\binom{4}{1}}{\binom{40}{4}} = 0.01576.$$

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Problem 2. (6 points.) Find

a. the probability all four cards are Red.

Solution:
$$P(all\ Red) = \frac{\binom{10}{4}}{\binom{40}{4}} = 0.002298.$$

b. the probability all four cards have even numbers, that is, each card has a face value from the set $\{2, 4, 6, 8, 10\}$.

Solution:
$$P(all\ even) = \frac{\binom{20}{4}}{\binom{40}{4}} = 0.05301.$$