Name: Richard

QUIZ 9 ♠

MATH 211
February 16, 2023

1. Five cards are dealt off of a shuffled 52-card deck and lined up in a row.

(a) How many such 5-card lineups are there in which all five cards have the same color? (i.e., all red, or all black)

Addition Principle:

$\underbrace{26\cdot25\cdot24\cdot23\cdot22}_{\text{all black}} + \underbrace{26\cdot25\cdot24\cdot23\cdot22}_{\text{all red}} = 2P(26,5) = \boxed{15,787,200}$

(b) How many such 5-card lineups are there in which **not** all five have the same color?

Subtraction principle

$\underbrace{52\cdot51\cdot50\cdot49\cdot48}_{\text{all line-ups}} - \left(\underbrace{26\cdot25\cdot24\cdot23\cdot22}_{\text{all black}} + \underbrace{26\cdot25\cdot24\cdot23\cdot22}_{\text{all red}}\right)$

$= P(52,5) - 2P(26,5) = \boxed{296,088,000}$

Name: Richard

QUIZ 9 ♢

MATH 211
February 16, 2023

1. Five cards are dealt off of a shuffled 52-card deck and lined up in a row.

(a) How many such 5-card lineups are there in which all five cards are of the same suit?

$\underbrace{13\cdot12\cdot11\cdot10\cdot9}_{\text{all clubs}} + \underbrace{13\cdot12\cdot11\cdot10\cdot9}_{\text{all hearts}} + \underbrace{13\cdot12\cdot11\cdot10\cdot9}_{\text{all spades}} + \underbrace{13\cdot12\cdot11\cdot10\cdot9}_{\text{all diamonds}}$

$= 4P(13,5) = \boxed{617760}$

(b) How many such 5-card lineups are there in which **not** all five cards are of the same suit?

$\underbrace{52\cdot51\cdot50\cdot49\cdot48}_{\text{all lineups}} - \underbrace{4(13\cdot12\cdot11\cdot10\cdot9)}_{\text{same suit}} = \boxed{311\,257\,440}$

Name: Richard

QUIZ 9 ♣

MATH 211
February 16, 2023

1. Five cards are dealt off of a shuffled 52-card deck and lined up in a row.

(a) How many such 5-card lineups are there in which all five cards are clubs, or all five are red?

Addition Principle

$\underbrace{13 \cdot 12 \cdot 11 \cdot 10 \cdot 9}_{\text{all clubs}} + \underbrace{26 \cdot 25 \cdot 24 \cdot 23 \cdot 22}_{\text{all red}} = P(13,5) + P(26,5)$

$= \boxed{8,048,040}$

(b) How many such 5-card lineups are there in which it is **not** the case that all five cards are clubs or all five are red?

Subtraction Principle

$\underbrace{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48}_{\text{all line-ups}} - \left(\underbrace{13 \cdot 12 \cdot 11 \cdot 10 \cdot 9}_{\text{all clubs}} + \underbrace{26 \cdot 25 \cdot 24 \cdot 23 \cdot 22}_{\text{all red}}\right)$

$= \boxed{303,827,160}$

Name: Richard

QUIZ 9 ♡

MATH 211
February 16, 2023

1. Five cards are dealt off of a shuffled 52-card deck and lined up in a row.

(a) How many such 5-card lineups are there in which all five cards are hearts, or all five are clubs?

Addition Principle

$\underbrace{13 \cdot 12 \cdot 11 \cdot 10 \cdot 9}_{\text{all hearts}} + \underbrace{13 \cdot 12 \cdot 11 \cdot 10 \cdot 9}_{\text{all clubs}} = 2P(13,5)$

$= \boxed{308,880}$

(b) How many such 5-card lineups are there in which it is **not** the case that all five cards are hearts or all five are clubs?

Subtraction Principle

$\underbrace{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48}_{\text{all line-ups}} - \left(\underbrace{13 \cdot 12 \cdot 11 \cdot 10 \cdot 9}_{\text{all hearts}} + \underbrace{13 \cdot 12 \cdot 11 \cdot 10 \cdot 9}_{\text{all clubs}}\right)$

$= \boxed{311,566,320}$