DISCRETE MATH
QUIZ 11

Name:______________________________

You have 10 minutes for this exam. If you have a question, raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**.

1. A single play of a certain game involves flipping a 2-sided coin, rolling a 6-sided die, then drawing a card from a 52-card deck.[1] How many outcomes are possible for a single play of the game?

$2 \cdot 6 \cdot 52 \quad (= 624)$

2. A play of the game is a "win of type (i)" if the coin shows heads and the die shows an even number, and is a "win of type (ii)" if the card drawn is $\diamondsuit$.

(a) How many different plays are wins of type (i) that are not wins of type (ii)?

The number of ways to flip a coin and then roll a die is $2 \cdot 6 = 12$. The number of these flip-roll combinations that can occur in a type-(i) win is $1 \cdot 3 = 3$. The remaining 9 flip-roll combinations do not occur in a type-(i) win.

A play that is a type-(i) win and NOT a type-(ii) win must one of the 3 flip-roll combinations mention in the 2nd sentence of the previous paragraph, followed by the selection of one of the (52-13) = 39 cards that are NOT $\diamondsuit$'s. There are $3 \cdot 39 = 117$ such plays.

(b) How many different plays are wins of type (ii) that are not wins of type (i)?

A play that is a type-(ii) win and NOT a type-(i) win must one of the 9 flip-roll combinations mention in the 3rd sentence of the first paragraph of (a), followed by the selection of one of the 13 $\diamondsuit$'s. There are $9 \cdot 13 = 117$ such plays.

(c) How many different plays are wins of type (i) that are also wins of type (ii)?

A play that is a type-(i) win AND a type-(ii) win must one of the 3 flip-roll combinations mention in the 2nd sentence of the first paragraph of (a), followed by the selection of one of the 13 $\diamondsuit$'s. There are $3 \cdot 13 = 39$ such plays.

(d) How many different plays are wins?

Since the sets of plays enumerated in (a), (b) and (c) are disjoint, the total number of wins is $117 + 117 + 39 = 273$.

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[1] A ***deck*** of cards has 52 cards. The cards are divided into 4 ***suits*** of 13 cards each. The suits are $\spadesuit, \diamondsuit, \heartsuit, \clubsuit$, and the cards within any suit are numbered $A, 2, \ldots, 10, J, Q, K$. All cards together are $A\spadesuit$, $A\diamondsuit$, $A\heartsuit$, $A\clubsuit$, $2\spadesuit$, $2\diamondsuit$, $2\heartsuit$, $2\clubsuit, \ldots, K\spadesuit$, $K\diamondsuit$, $K\heartsuit$, $K\clubsuit$.