

MATH 10110-01: Principles of Finite Mathematics
Section 5.6: Further Counting Problems
In-Class Sample Problems

Name _____ Date _____

1. An urn contains 15 numbered balls, of which 10 are red and 5 are white. A sample of 4 balls is to be selected.

(a) How many different samples are possible?

(b) How many samples have all red balls?

(c) How many samples have 2 red and 2 white balls?

(d) How many samples have exactly 3 red balls?

(e) How many samples have at least 3 red?

(f) How many samples have less than 2 red balls?

2. Recall that a standard deck of cards has 52 cards. The cards can be classified according to suits or denominations. There are 4 suits: hearts, diamonds, spades, and clubs. There are 13 different denominations of cards in each suit: ace, king, queen, jack, ten, nine, eight, seven, six, five, four, three, and two. A poker hand consists of 5 cards dealt from the deck.

(a) How many different poker hands are possible?

(b) A flush is a poker hand in which all of the cards have the same suit. How many different poker hands are flushes?

(c) How many different poker hands consist of three kings and two aces?

(d) How many different poker hands consist of exactly three kings (plus two other cards that are not kings)?

(e) How many different poker hands consist of exactly three cards of the same denomination, plus any other two cards of a different denomination? (Hint: This is the same as exactly 3 twos OR exactly 3 threes OR exactly 3 fours OR ... OR exactly 3 kings OR exactly 3 aces.)

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Answer Key:

1. a) $C(15, 4) = 1365$

b) $C(10, 4) = 210$

c) $C(10, 2) \cdot C(5, 2) = 45 \cdot 10 = 450$

d) $C(10, 3) \cdot C(5, 1) = 120 \cdot 5 = 600$

e) $600 + 210 = 810$

f) $C(10, 0) \cdot C(5, 4) + C(10, 1) \cdot C(5, 3) = 105$

2. a) $C(52, 5) = 2,598,960$

b) $C(13, 5) + C(13, 5) + C(13, 5) + C(13, 5) = 5148$

c) $C(4, 3) \cdot C(4, 2) = 24$

d) $C(4, 3) \cdot C(48, 2) = 4512$

e) $4512 + 4512 + \dots + 4512 = 13 \cdot 4512 = 58,656$