Homework 6, Math 189 Fall 2023

Dr Holmes

October 5, 2023

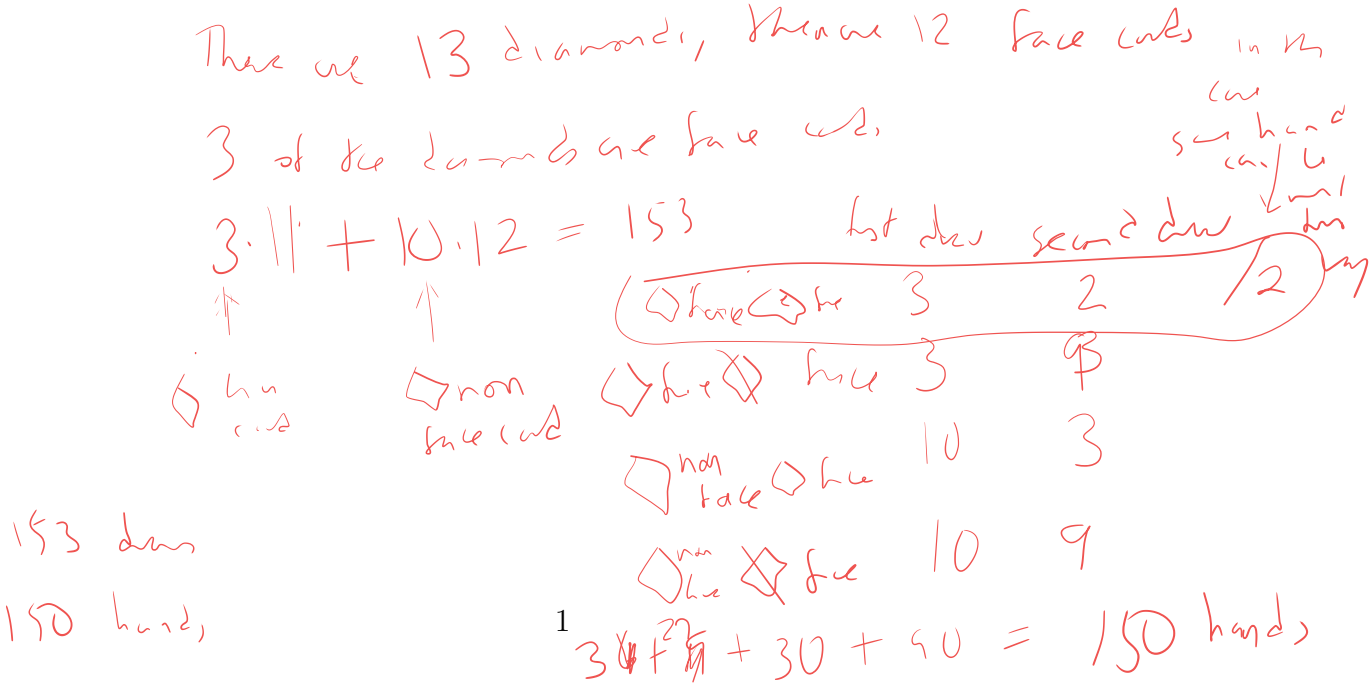
This is homework from sections 1.1, 1.2.

I'll point out related problems in Levin as usual (some problems may actually be from Levin).

This is due Friday, both because I'm posting it a day late and because I will not be teaching the class on the 25th (Dr Teitler will lecture about 1.2 and 1.3) and I want you to have a day when you can ask *me* questions in class.

1. (like an example we did in class) In how many different ways can you draw a diamond, then a face card, from a standard deck of cards?

   How many hands of two cards can you form in this way (the answer to this is not the same, be careful)?



2. (similar to 1.1 problem 12) Consider the 5 letter "words" made from the usual alphabet (all five letter character strings).

   (a) How many of these are there? $26^5 = 11881376$

   (b) How many of these have no double letters? (no letter can be immediately followed by the same letter). $26 \cdot 25^4 = 10156250$

   (c) How many of the five letter words (no double letter restriction in this or following parts) begin with a vowel (**aeiou**)? $5 \cdot 26^4 = 2284880$

   (d) How many of these begin with the three letter string "dab"? $26^2 = 676$

   (e) How many of these begin with the three letter string "dab" and end with the three letter string "dab"? none

   (f) How many of these begin with the three letter string "dab" and end with the three letter string "bad"? 1 dabad

3. Do Levin section 1.1 problem 14.

$(3+1)\cdot(1+1)\cdot(4+1)\cdot(2+1) = 120$

$2^i \cdot 3^j \cdot 5^k \cdot 7^l$

0 is the only possible exponent

4. (similar to Levin 1.2 exercises 1-3) Consider the set of all digits $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$.

   (a) How many subsets with four elements does it have? Show any calculations you need to make.

   (b) How many of these subsets have all elements even?

   (c) How many of the four element subsets of the digits have $\{3, 7\}$ as a subset?

a. $\frac{10 \cdot 9 \cdot 8 \cdot 7}{24} = 210 = \binom{9}{4}$

b. $\binom{5}{4}$ $\frac{5 \cdot 4 \cdot 3 \cdot 2}{1 \cdot 2 \cdot 3 \cdot 4} = 5$

c. $\binom{8}{2} = \frac{8 \cdot 7}{2 \cdot 1} = 28$

5. (this resembles 1.1 problems 7, 8) In an elementary school classroom, 15 students like chocolate ice cream, 10 like vanilla ice cream, 13 like strawberry ice cream, 7 like chocolate and vanilla, 8 like chocolate and strawberry, 3 like strawberry and vanilla, and two happy students like all three. Five students do not like ice cream at all (poor things), or at least not any of those kinds. How many students are in the class?

$15 + 10 - 13 - 7 - 8 - 3 + 2 + 5 = \boxed{29}$