MATH S-15, SUMMER 2001
GROUPS, GRAPHS, AND ALGEBRAIC STRUCTURES FOR COMPUTING
Homework Assignment # 9
Due: July 30, 2001

Reading

Sections 8.8 and 8.11 and hand-out.
(Additionally, you might read Sections 12.1–12.3.)
In preparation for next time, Sections 6.1-6.3 and 6.5-6.6.

Required Problems

1. How many ways are there to get a **full house** (two of one kind and three of another kind) in poker?

2. How many ways are there to get a **flush** (all cards same suit) in poker? (Note: There is potentially confusing exception here in that five cards of the same suit *in sequence* is known as a **straight flush**, which is different from (and better than) a flush.)

3. How many ways are there to get a **straight** (five cards in a row in any combination of suits) in poker? (Note: As with a flush, there is a potentially confusing exception here in that while a straight flush (see #2) does meet the definition of a straight, it is a better hand and is not counted as being merely a straight. Also, an ace may be counted as either high or low but not both, so that A-2-3-4-5 and 10-J-Q-K-A are straights but Q-K-A-2-3 is not.)

4. Problem # 2 from p. 341 of Section 8.8.

5. Problem # 12 from p. 342 of Section 8.8.

6. How large a group of people do you need to assure that at least three of them have birthdays on the same day of the week this year?

7. Do exercise # 3 from p. 363, Section 8.11, but also discuss the long-term behavior of the system.

8. Do problem# 2.16 from p. 76 of the hand-out.

Exploratory Problems

9. There are some variations of poker in which there is another hand known as a **four-flush**, with four cards of one suit and the fifth card of another. (A four-flush is better than a pair even if the fifth card has a rank matching one of the other four.) Where should a four-flush rank relative to two pairs, three of a kind, and a straight?

10. In bridge (or any other game such as) where all 52 cards are dealt out equally among four players, how many hands are there with one six-card quit, two three-card suits, and one one-card suit?

11. Problem # 18 from p. 342 of Section 8.8.

12. Do exercise # 7 from p. 364, Section 8.11.

13. Do problem# 2.17 from p. 76 of the hand-out.

14. Suppose we pick a set of 51 integers from 1 to 100. Show that there is (at least) one pair such that one divides the other evenly.

15. Problem # 2 from p. 474 of Section 12.2. *(Hint: Read Section 12.2.)*

16. Problem # 10 from p. 480 of Section 12.3. *(Hint: Two integers are* **relatively prime** *if their greatest common divisor is 1.)*