The “ungraded” problems have their answers in the back. You are encouraged to work them and solutions will be provided, but they are, well, not graded. It is not necessary to submit these in your assignment, but they are “fair game” for the exams.

The symbol \( (E) \) means that at least part of this problem appeared on an old exam, up to possible numerical alterations.

Remember that you are welcome to collaborate on homeworks as long as you write your own solution sheet and do not copy without understanding. Also remember that I will not offer individual help on the math by email, but will answer questions in class.

Future assignments will contain proofs.

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(ungraded) \textit{Brualdi \S 2.7 – 2 (13 of one suit, followed by 13 of another suit, etc.), 8, 13a.}

1. How many integers are there between 0 and 999,999 with six distinct digits?

2. A password for an account at the firm Vampire Squid Investments is nine symbols long. Possible symbols are the 26 upper case letters of the English alphabet, the 26 lower case letters of the English alphabet, the 10 numerals and, of course “$”: 63 symbols in all. The VSI rule is that your password must contain exactly one “$” in any of the nine positions. The other eight positions can be filled by any choice of the other 62 symbols, no restriction. How many different passwords are possible? (An acceptable password is: “23r$FUN”.)

3. This problem involves your integer \( N \). A candy store makes \( N \) different kinds of chocolate cubes and defines a \textit{grab-bag} as an unordered selection of 8 chocolate cubes, with no restriction on the number of each kind of chocolate. How many different grab-bags are possible? It’s ok to leave your answer with factorials, but the actual letter \( N \) should not appear!

4. \( (E) \) We want to sit 6 men, 6 women and a turtle in a circular table. In how many ways can this be done if no man is to sit next to a man and no women is to sit next to a woman? (Compare with \textit{Brualdi \S 2.7, \#8 in the ungraded section}.)

5. \( (E) \) a. How many ways can the letters A,L,T,G,E,L,D,H,A,L,L be arranged?
   b. How many ways can the letters A,L,T,G,E,L,D,H,A,L,L be arranged if the A’s are not consecutive? (Hint: first place the A’s.)

6. \( (E) \) How many ways can you partition the set \( \{1, 2, 3, 4, 5, 6, 7, 8, 9\} \) as a union of four disjoint sets \( A_1 \cup A_2 \cup A_3 \cup A_4 \) so that each \( A_i \) has at least two elements? You will want to first figure out the possible values of the 4-tuple \( (|A_1|, |A_2|, |A_3|, |A_4|) \) before you count.