Permutations / C programming homework EOM - Do before end-of-module quiz

The ungraded homework assigned below is never turned in, but should be completed before the end-of-module quiz opens.

The graded homework assigned below is due 24 hours before the end-of-module quiz opens. No late graded homework is accepted.

The end-of-module homework can be done individual or collaboratively. Read the collaboration policy to know what this means.

Ungraded homework

The point of ungraded homework is to develop your abilities and prepare you for the quiz. Solutions will be provided, but they should be consulted only when you need a hint and/or afterward to compare and contrast your solution with mine.

1. You are given a black box *f* that has either a standard 52-card deck-of-cards or a 48-card deck-of-cards for the game pinochle. You are allowed to activate *f* once, upon which a card is chosen at random and you are given the card. In pseudocode, give an algorithm that uses *f* once and then guesses either "standard" or "pinochle". Evaluate the advantage your algorithm achieves.

   In this problem you can maximize your advantage by identifying all of the cards that are more likely with one type of deck and guess that type of deck if any of those cards appear.

2. You are given a black box *f* that has either a 30-sided die or a 34-sided die inside. Each time you activate *f* the die is rolled and you are told the resulting value. You are allowed *q* activations. In pseudocode, give an algorithm that uses *f q* times and then guesses either "30-sides'' or "34-sides''. Evaluate the advantage your algorithm achieves as a function of *q*.
3. List all of the element of Z_{16} that have a multiplicative inverse (mod 16). For each, also find its inverse. *Recall that x has a multiplicative inverse (mod 16) iff gcd(x,16)=1. Also, the inverse must be in Z_{16} (ie, y is x's inverse if xy mod 16 = 1 and y is in Z_{16}.*
4. At https://codestepbystep.com do the following problems in the C/bitwise section: bittoggle, bits_to_flip, cmp_bits, reverse_bits.

Ungraded homework solutions

Study these after completing the homework and/or after struggling with it for a while.

C programming solutions
Other solutions

Graded homework

1. On Canvas an Old EOM Quiz for this module will appear soon. Complete the quiz before it closes, 24 hours before the end-of-module quiz opens.

   Each old quiz is worth 1% of your overall grade. It is untimed and you may take it as many times as you want. You may do it alone or in collaboration. It is intended as a warm-up for the actual quiz.

2. On Mimir a programming assignment for this module will appear soon. Complete the assignment before it closes, 24 hours before the end-of-module quiz opens.

   Mimir requires that you have an account at https://www.mimirhq.com/. If you haven't already, register with the exact same first and last name that Canvas has for you and sign up for course code 7d1e6705c2.