Problem 1
In how many ways can we construct a word of length 7 (not necessarily found in the dictionary) by using exactly 3 vowels? Assume the regular alphabet. For parts (a), (b), and (c), the programs are separate.

(a) First let’s focus on one aspect of the problem. In how many ways can we choose which 3 positions in the word will hold the vowels? Write a program to count this.

(b) Now let’s focus on another aspect. Given 3 letters that are vowels, in how many ways can we assign vowels to them. Also write a program to count this.

(c) Finally, in how many ways can we complete the rest of the word? Write a program to count this.

(d) Combine all three parts in one program. Try to use one and all if we can.

(e) Solve the problem without multistep counting.

Problem 2
In how many ways can we pick J, J, and K, with exactly 2 suits?

Problem 3
Consider the problem of seating 5 people on 2 chairs. One idea is to first choose 3 people, and thus eliminate 2 that will not sit. Then, among the selected 3, seat 2 on 2 chairs. Here’s a program in #P:

```plaintext
person = nonreusable {a,b,c,d,e}
chair = nonreusable {1,2}
rep = {?person:3}
choice = all rep
#size of choice is now equal to count rep
s = one rep
#s is now a set of 3 selected people
count (?choice, {(?s, ?chair):2})
```

Why does this strategy produce the wrong count?