**Question 7**

1. 26^8 = 208827064576
2. P(26,8) = 26!/(26-8)! = 62990928000
3. 26^7 = 8031810176
4. Since X is already chosen in the first digit and the letters can’t be repeated, the problem is akin to selecting and arranging 7 elements out of a set of 25, or P(25,7) = 25!/(25-7)! = 3315312000

**Question 8**

Number of permutations between the domain with n elements and codomain m elements is P(m, n), where m>= n. In our case, n = 5, thus:

1. 0 since a one-to-one function is not possible as there are fewer elements in the codomain than in the domain.
2. P(5,5) = 5! = 120
3. P(6,5) = 6!/(6-5)! = 720
4. P(7,5) = 7!/(7-5)! = 2520

**Question 9**

Step 1: Find total number of possible subsets with 100 elements: 2^100  
Step 2: Find number of possible subsets that contain only 1 element: C(100,1) = 100!/1!\*(100-1)! = 100  
Step 3: Remember to also subtract the case of empty set (1) from the total, as the empty set is a subset of all sets  
Step 4: Total possible subsets containing more than 1 element = 2^100 – 100 – 1 = 1267650600228229401496703205275

**Question 10**

1. Step 1: Find set of possible individuals selected, besides the bride: C(9,5) = 9!/5!\*(9-5)!= 126

Step 2: Find number of permutations with 6 people: 6! = 720

Step 3: Total possible permutations: Step 1 \* Step 2 = 90720

1. Step 1: Find set of possible individuals selected, besides the couple: C(8,4) = 8!/4!\*(8-4)!= 70

Step 2: Find number of permutations with 6 people: 6! = 720

Step 3: Total possible permutations: Step 1 \* Step 2 = 50400

* 1. Method 1:

Step 1: Find set of possible individuals selected, if neither of the couple is selected: C(8,6) = (8!/6!\*(8-6)!) = 28

Step 2: Total possible permutations = total possible set if no restrictions are placed - # of permutations if both of the couple are selected - # of permutations if neither of them is selected = P(10,6) – 50400 – P(8,6) = 151200 - 50400 – 20160 = 80640

* 1. Method 2 (just because I like doing it for fun):

Step 1: Find set of possible individuals selected, if the bride is selected and the groom is not: C(8,5) = 8!/(5!\*(8-5)!) = 56

Step 2: Find number of permutations with 6 people: 6! = 720

Step 3: Total possible permutations if bride is selected and groom is not = Step 1 \* Step 2 = 40320

Step 4: Possible permutations if exactly one of the couple is selected = number of permutations if only the bride is selected + number of permutations if only the groom is selected = 2\* number of permutations if only the bride is selected = 2\*Step 3 = 80640

**Question 11**

1. Combinations of exactly 3 ones: C(12,3) = 12!/(3!\*(12-3)!) = 220
2. # of combinations of no one, 1 one, 2 ones, and 3 ones = C(12,0)+C(12,1)+C(12,2)+C(12,3) = 1+12+66+220=299
3. Number of total possible combinations – number of combinations containing 2 ones – number of combinations containing 1 one - number of combinations containing no one = 2^12 – C(12,2) – C(12,1) – C(12,0) = 4017

**Question 12**

1. 7! = 5040
2. Total number of possible permutations – number of permutations when E and D are adjacent (meaning, when either “ED” or “DE” appears) = 8! – 2\*7! = 40320 – 2\*5040 = 30240
3. Add numbers of permutations of “CD” and “DE” and subtract out that of “CDE” to avoid double counting: 2\*7! – 6! = 10080 – 720 = 9360