Math 74, Week 2 Redo

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I have redone the problems that require regrading here in Latex.

1 Wed Lec, 6

Even numbers must end in one of $0, 2, 4, 6, 8$. Since if a number has the last number as an odd number, it is equal to $10k + 2n + 1$, which is odd.
Now we consider the last digit, if it is 0:
We have 9 choices for the first number, and then since the numebrs are not repeating, 8 choices for the second, for a total of:

$$9 \times 8 = 72$$

Otherwise the last digit must be $2, 4, 6, 8$. Since we don't have repeated numbers, and the first number cannot be 0, we have 8 choices for the first digit, and with 2 already chosen, we have 8 choices for the second one as well:

$$4 \times 8 \times 8 = 256$$

We now sum up these two cases: $256 + 72 = 328$

2 Wed Dis, 3

2.1 a

For this problem we can split the cases into passwords that have $6, 7, 8, 9$ characters. For each sub-problem there are 26 choices for each slot, so when there are 6 characters we have 26^6 choices, 26^7 for 7 characters, and so on. So we sum these up to count the total number of cases:

$$26^6 + 26^7 + 26^8 + 26^9$$

2.2 b

To calculate the amount of "at least once" we can calculate its complement: where the letter "e" does not appear once. We then have 25 choices for each slot:

$$25^6 + 25^7 + 25^8 + 25^9$$

So to get the answer to this problem we subtract it from the one we found in (a):

$$26^6 + 26^7 + 26^8 + 26^9 - (25^6 + 25^7 + 25^8 + 25^9)$$

3 Fri Lec, 4

We first treat each letter as a unique character. Since the word has 11 characters we have 11! ways of rearranging it.
Next we observe that "S" is repeated 4 times, "I" is repeated 4 times, and "P" twice, so we divide them, leaving us with:

$$\frac{11!}{4! \times 4! \times 2!}$$