Homework 2 Solutions

Problems

1. **Florian goes out to dinner at Chili's to celebrate the fact that he's not teaching calculus this year. He plans to order chips with either salsa, queso, or guacamole; either chicken or portabello mushroom fajitas; and one of Chili's five signature margaritas. How many ways are there for him to order dinner?**

   There are 3 choices for the dipping sauce for his chips; 2 choices for the type of fajitas; and 5 choices for the margarita. So by the multiplication principle there are a total of $3 \cdot 2 \cdot 5 = \boxed{30}$ ways to order dinner.

2. **How many 4 digit numbers are there using the digits 0, 1, 2, 3, 4, 5, and 6? Be careful: the first digit can't be zero! How many of these are even?**

   There are 6 choices for the first digit (anything but zero) and 7 choices for each of the remaining 3 digits, for a total of $\boxed{6 \cdot 7^3}$ choices.

   If the number must be even, there are 4 choices for the last digit (0, 2, 4, or 6), 6 choices for the first digit (anything but zero), and 7 choices for each of the middle digits. Thus the total number of choices is $\boxed{4 \cdot 6 \cdot 7^2}$.

3. **How many license plates are there of the form 3 letters, then 3 numbers? What if we restrict the 3 numbers, considered as a 3-digit number, to be between 141 and 602, inclusive?**

   There are 26 choices for each of the first three letters and 10 choices for each of the three numbers. Thus there are $\boxed{26^3 \cdot 10^3}$ such license plates.

   For the second part, there are still 26 choices for each of the first three letters, and then $602 - 141 + 1 = 462$ choices for the 3-digit number, for a total of $\boxed{26^3 \cdot 462}$ possibilities.

4. **How many 5-letter words (remember, for us a word is just a string of letters, not necessarily a word in the English language) can be formed using the standard 26-letter alphabet? How many with at least one z?**

   There are 26 possibilities for each of the five letters, giving $\boxed{26^5}$ possible words.

   The number of words with at least one z is given by the total number of words, which we just computed, minus the number of words with no z. There are 25^5 words with no z, since in that case there are 25 choices for each letter. Thus the number of five letter words with at least one z is $\boxed{26^5 - 25^5}$.