Homework 1 Solutions

Problems

1. **Prince Charles, the eldest son of Queen Elizabeth II, is 1st in line to the throne of England. Heinrich von Pezold is 1244th in line to the throne. How many people would Heinrich have to bump off to become 1st in line to the throne?**

   He would have to bump off, for example, the 1st in line to the 1243rd, and the number of numbers between 1 and 1243 inclusive is $\boxed{1243}$.

2. **How many numbers are there between 1729 and 1981, inclusive?**

   We use our formula $\boxed{1981 - 1729 + 1 = 253}$

3. **How many numbers are there between 82 and 190, inclusive? How many of them are even? How many are odd?**

   $\boxed{190 - 82 + 1 = 109}$

   For the second part of the question we observe that the even numbers between 82 and 190 are in one-to-one correspondence with those numbers between 41 and 95, and there are $\boxed{95 - 41 + 1 = 55}$ even numbers in the range specified. Then, since every number is either odd or even, we see there are $\boxed{109 - 55 = 54}$ odd numbers.

4. **How many four-digit numbers (that is, numbers between 1000 and 9999, inclusive) are divisible by 5? How many are divisible by 12? (*Hint:* You'll need to figure out the highest and lowest such number.)**

   The highest and lowest numbers in that range which are divisible by 5 are 1000 and 9995. Dividing by 5, we see that the multiples of 5 between 1000 and 9995 are in one-to-one correspondence with those numbers between 200 and 1999, of which there are $\boxed{1999 - 200 + 1 = 1800}$

   The highest and lowest numbers in that range which are divisible by 12 are 1008 and 9996. Dividing by 12, we see that the multiples of 12 between 1008 and 9996 are in one-to-one correspondence with those numbers between 84 and 833, of which there are $\boxed{833 - 84 + 1 = 750}$.