CS 225 Assignment 5 - Part 2
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Section 9.4

6a)
There are 6 different remainders that are obtained when an integer is divided by 6.
0, 1, 2, 3, 4, and 5.
Pigeon hole principle: 7 integers are divided by 6 then at least two of them have the same remainder. When divided by 6 there must be two integers among any 7 integers that have the same remainder. The answer to 6a is **Yes**.

6b)
Set of integers 0, 1, 2, 3, 4, 5, and 6. All of these integers have different remainders when divided by 8, so the answer is **No**.

7)
Set S = {3, 4, 5, 6, 7, 8, 9, 10, 11, 12}
Partitioning the set: [3, 12] [4, 11] [5, 10] [6, 9] [7, 8]
The sum of these two integers in each partition is 15.
The two distinct ints are 7 and 8 and their set is {7, 8} which is summed up to 15.

16)
There are 80 integers between 1 and 100 that are non-multiples of 5.
Anything else is a multiple of 5.
If we pick 81 integers, then *at least* one is a multiple of 5. Hence the answer is **81**.

27)
Leap year = 366 days.
General Pigeonhole principle = 366n+1 which implies (n+1) people would have the same b-day.

366 * 4 + 1 = 1465 people. (n+1) = (4 + 1) = 5
366 * 5 + 1 = 1831 people (n+1) = (5 + 1) = 6
366 * 6 + 1 = 2197 people (n+1)=(6+1) = 7
With 2000 people at least **6** people have the same birthday.