

Worksheet 7
Review

1. A game show has the following challenge couples. There are 7 disks laid out on a table, and each disk contains a number from 1 to 20. No two disks contain the same number. The couple will win the challenge if each person has some of the disks and the total match the other person (it is okay if they leave some of the disks on the table.) Show that this challenge can always be won.
2. Laura has developed a latte habit. Over the last 50 days she has bought a total of 70 lattes. She always has at least one latte a day. Show that there are some consecutive days during which Laura bought *exactly* 24 lattes.
3. Recall octahedron dice are dice that have 8 sides numbered from 1 to 8. Suppose that 10 octahedron dice are thrown at the same time. How many ways can this be done so that every number appears in the roll?
4. Suppose we have a sequence of 10 integers, say $a_1, a_2, \dots, a_{10}$. Show that there is some subset of consecutive numbers whose sum is divisible by 10.
5. Suppose that 52 integers are picked. Show that there is some pair of integers m and n such that either $m - n$ or $m + n$ is divisible by 100.
6. There is a bag that has 3 red marbles, 3 green marbles, 5 yellow marbles and 5 blue marbles. Marbles of the same colour are considered indistinguishable.
 - (a) How many distinct ways can you draw a pile of 7 marbles?
 - (b) How many distinct ways can you give 7 people a marble from the bag?

7. Joey invents a game where a person pulls 6 cards from a standard deck of cards. He is trying to figure out if he should make a winning pull to be that the person has drawn all suits, or that a person has drawn an even number of suits. To help him figure this out, find the following numbers.
- (a) How many 6 card hands can be drawn from a standard deck?
 - (b) How many 6 card hands can be drawn from a standard deck where all four suits are present?
 - (c) How many 6 card hands can be drawn from a standard deck where exactly two suits are present?
8. How many RU paths do not pass over the broken links?

