THE UNIVERSITY OF BRITISH COLUMBIA

Math 414 Section 101

Homework 5 *Due by 1pm on October 11, 2019*

1. Cassandra sets her watch to the correct time at 11:00am. At the actual time of 2:00pm she notices that her watch reads 1:55 and 30 seconds. Assuming that her watch loses time at a constant rate, what will be the actual time, to the nearest second, when her watch first reads 11:00pm?

2. A point P lies inside a rectangle so that it is 5 cm from one corner, 14 cm from the opposite corner, and 10 cm from a third corner. How far is P from the fourth corner of the rectangle?

3. When the mean, median and mode of the list

$10, 2, 5, 2, 4, 2, x$

are arranged in increasing order, they form a non-constant arithmetic progression. What is the sum of all possible real values of x?

4. To shovel all of the snow on his driveway, Kevin needs 12 hours. Individually, Dave needs 8 hours to shovel all of Kevin's snow, John needs 6 hours to shovel all of Kevin's snow, and Allison needs 4 hours to shovel all of Kevin's snow. If Kevin, Dave, John, and Allison all work together, how many minutes do they need to shovel all of Kevin's snow?

5. You are visiting a town of truthtellers and liars. Also visiting the town is a Toggler who "toggles" (or alternates) between telling the truth and telling a lie. Furthermore, whether the Toggler begins with a truth or a lie is unknown. All individuals look alike and you wish to determine who the Toggler is. To do this, you may ask up to two questions, each to a single person. How do you determine who the Toggler is?