

Cosc 4740
Written Q15

Worth 15 points

*All answers are to be typed. This is **NOT** a programming assignment, no compiler needed, which also means it is due at class time.*

There are three kinds of processes: 1 Santa process, 9 reindeer processes, and several (>3) elf processes. The reindeer pull Santa's sleigh at the time of Christmas and take vacation in the South Pacific rest of the time. The elves make toys all the time. The Santa sleeps in his shop at the North Pole and can be woken up:

- a. by an elf when some elves are having difficulty making toys, or
- b. by a reindeer when all 9 reindeer are back from their vacation and are ready to go around the world to celebrate Christmas.

To allow Santa to get some sleep, the elves can only wake him when three of them have problems. When three elves are having their problems solved, any other elves wishing to visit Santa must wait for those elves to return.

As reindeer return from their vacation, they wait in a warming hut until the last reindeer arrives, who wakes up Santa. It is assumed that the reindeer don't want to leave the tropics, and therefore they stay there until the last possible moment.

If Santa wakes up to find three elves waiting at his shop's door, along with the last reindeer having come back from the tropics, Santa has decided that the elves can wait until after Christmas, because it is more important to have his sleigh ready.

You have to write three procedures: **Santa()**, **elf()**, and **reindeer()**. Santa executes **Santa()**, elves execute **elf()**, and reindeer execute **reindeer()**. Use semaphores for synchronization.