i)

```
welka@egr-v-cmsc312-1:~/assignment2$ ./1
Reader 1: read cnt as 1
Reader 2: read cnt as 1
Reader 3: read cnt as 1
Reader 6: read cnt as 1
Reader 4: read cnt as 1
Reader 5: read cnt as 1
Reader 7: read cnt as 1
Reader 10: read cnt as 1
Reader 8: read cnt as 1
Writer 1 modified cnt to 2
Writer 2 modified cnt to 4
Writer 4 modified cnt to 8
Writer 5 modified cnt to 16
Reader 9: read cnt as 16
Writer 3 modified cnt to 32
```

```
welka@egr-v-cmsc312-1:~/assignment2$ ./2
Reader 1: read cnt as 1
Reader 2: read cnt as 1
Reader 5: read cnt as 1
Reader 3: read cnt as 1
Reader 6: read cnt as 1
Reader 7: read cnt as 1
Reader 8: read cnt as 1
Reader 4: read cnt as 1
Reader 9: read cnt as 1
Writer 1 modified cnt to 2
Writer 5 modified cnt to 4
Writer 2 modified cnt to 8
Writer 3 modified cnt to 16
Reader 10: read cnt as 16
Writer 4 modified cnt to 32
```

```
welka@egr-v-cmsc312-1:~/assignment2$ ./3 5 5
Writer 0 modified cnt to 2
Writer 3 modified cnt to 4
Writer 4 modified cnt to 8
Writer 1 modified cnt to 16
Reader 1: read cnt as 16
Reader 2: read cnt as 16
Reader 3: read cnt as 32
Writer 2 modified cnt to 32
Reader 4: read cnt as 32
Reader 5: read cnt as 32
^C
CTRL+C detected. Terminating all processes and threads
welka@egr-v-cmsc312-1:~/assignment2$ ./3 5 5
Writer 0 modified cnt to 2
Writer 1 modified cnt to 4
Writer 3 modified cnt to 8
Reader 1: read cnt as 16
Reader 3: read cnt as 16
Writer 2 modified cnt to 16
Reader 4: read cnt as 16
Reader 2: read cnt as 16
Reader 5: read cnt as 16
Writer 4 modified cnt to 32
welka@egr-v-cmsc312-1:~/assignment2$
```

ii) I just added a variable to keep track of the number of active readers and used that variable in a while loop within the reader function to determine if the writer processes have completed or not.

iii) I used the native signal function to detect a CTRL+C signal and then when that is detected it triggers my signal_handler function which prints out the termination message and terminates all processes and threads.

iv) I used a mutex and a semaphore so that each writer will have a reader go in and check the shared data after it is written into. I was not able to achieve this perfectly as sometimes the reader will read the value before the writer has printed the updated value, not sure why this is occurring.