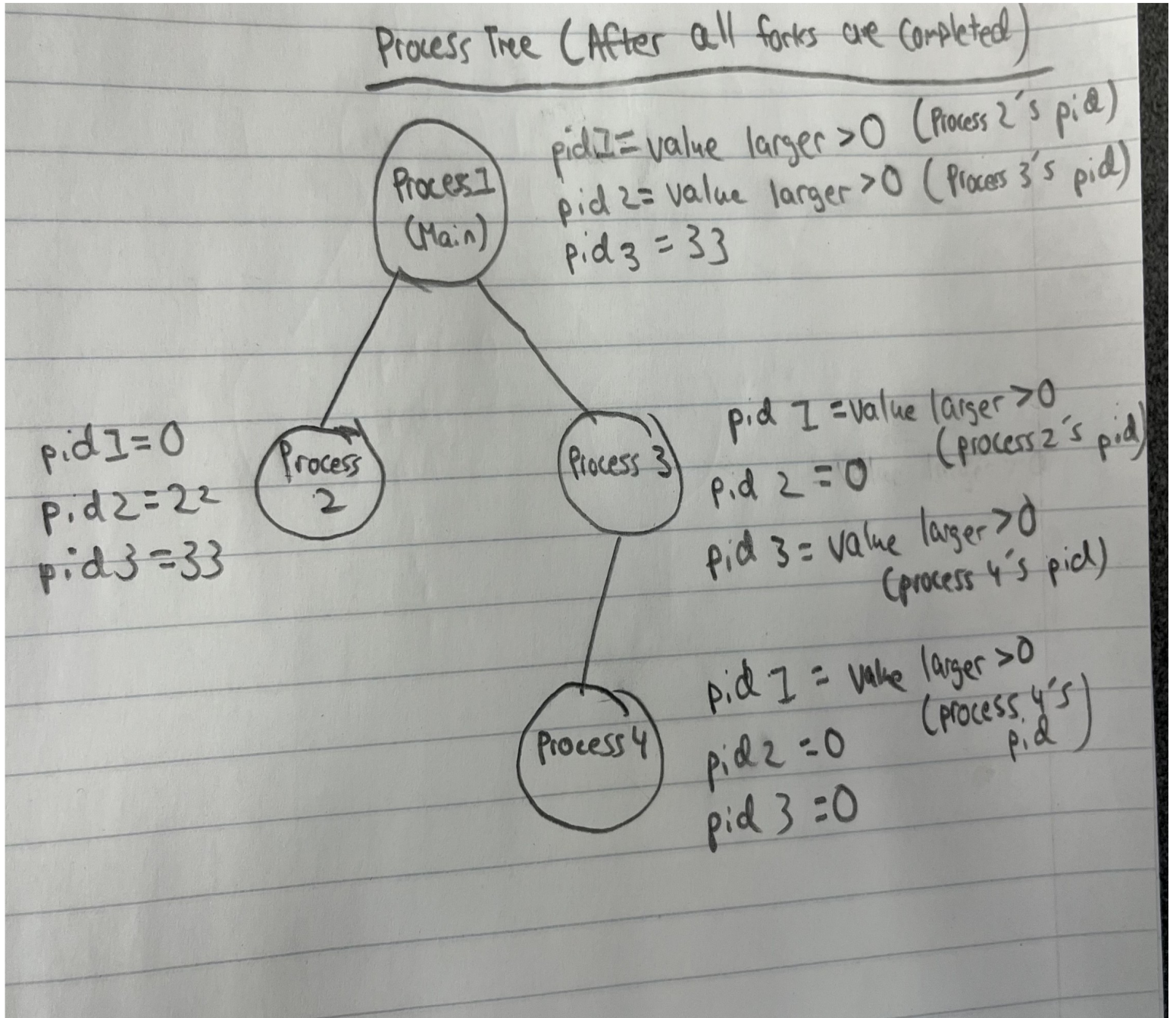


Part A)



Part B)

This is the command I used to find the configured kernel HZ value (which was 250) which I ended up using later in my code to calculate the tick time in milliseconds

```
jeevan@jeevan-virtual-machine:~$ zcat /boot/config-$(uname -r) | grep CONFIG_HZ
gzip: /boot/config-5.15.0-60-generic: not in gzip format
jeevan@jeevan-virtual-machine:~$ cat /boot/config-$(uname -r) | grep CONFIG_HZ
# CONFIG_HZ_PERIODIC is not set
# CONFIG_HZ_100 is not set
CONFIG_HZ_250=y
# CONFIG_HZ_300 is not set
# CONFIG_HZ_1000 is not set
CONFIG_HZ=250
jeevan@jeevan-virtual-machine:~$ s
```

```
jeevan@jeevan-virtual-machine:~$ cd jv1564 lab3
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ make clean
make -C /lib/modules/5.15.0-60-generic/build M=/home/jeevan/jv1564_lab3 clean
make[1]: Entering directory '/usr/src/linux-headers-5.15.0-60-generic'
  CLEAN   /home/jeevan/jv1564_lab3/Module.symvers
make[1]: Leaving directory '/usr/src/linux-headers-5.15.0-60-generic'
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ make
make -C /lib/modules/5.15.0-60-generic/build M=/home/jeevan/jv1564_lab3 modules
make[1]: Entering directory '/usr/src/linux-headers-5.15.0-60-generic'
  CC [M]   /home/jeevan/jv1564_lab3/lab3.o
  MODPOST /home/jeevan/jv1564_lab3/Module.symvers
  CC [M]   /home/jeevan/jv1564_lab3/lab3.mod.o
  LD [M]   /home/jeevan/jv1564_lab3/lab3.ko
  BTF [M]  /home/jeevan/jv1564_lab3/lab3.ko
Skipping BTF generation for /home/jeevan/jv1564_lab3/lab3.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-5.15.0-60-generic'
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ sudo dmesg -C
[sudo] password for jeevan:
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ ls
lab3.c lab3.ko lab3.mod lab3.mod.c lab3.mod.o lab3.o Makefile modules.order Module.symvers report.odt
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ sudo insmod lab3.ko
insmod: ERROR: could not insert module lab3.ko: File exists
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ sudo rmmod lab3.ko
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ sudo dmesg -C
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ sudo insmod lab3.ko
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ sudo rmmod lab3.ko
jeevan@jeevan-virtual-machine:~/jv1564_lab3$ sudo dmesg
[ 7959.755621] Hello, world
[ 7959.755631] The tick time in milliseconds is 4
[ 7963.959196] The time difference found using the jiffies metric is 4000 milliseconds
[ 7963.959200] The time difference found using the ktime_t metric is 4203 milliseconds
[ 7963.959200] Goodbye, cruel world
jeevan@jeevan-virtual-machine:~/jv1564_lab3$
```

Above are the commands I used to:

1. Clean my program
2. Compile my program (using Makefile)
3. Load and Unload the kernel module
4. Check message logs

Note that the time difference was found using both the jiffies and ktime\_t metrics. Both numbers were then converted into milliseconds which is easier to understand and printed .