CS4023 Tutorial 1

1. What is the difference between multiprogramming, multitasking and multiprocessing?
2. What is the purpose of the command line interpreter? Why is it usually separate from the kernel?
3. What is the purpose of system programs?

4. Using system calls, write a program in either in C, C++, or Java that reads data from one file and copies it to another file.

5. Using the program shown below, explain what will be output in Line A.

```
#include <sys/types.h>
#include <stdio.h>
#include <unistd.h>

int value = 5;

int main()
{
   pid_t pid;

   pid = fork();

   if (pid == 0) { /* child process */
        value += 15;
   }
   else if (pid > 0) { /* parent process */
        wait(NULL);
        printf("PARENT: value = %d", value); /* LINE A */
   }
   exit(0);
}
```

6. Consider the fork() example in Wikipedia (http://en.wikipedia.org/wiki/Fork_(operating_system)) and make sure you understand its output. In your own time, explore the links to other fork() related topics.

```
pid_t pid;
pid = fork();
if (pid == 0) {
   int j;
   for (j = 0; j < 10; j++) {
      printf("child: %d\n", j);
      sleep(1);
   }
   _exit(0); /* Note that we do not use exit() */
}
else if (pid > 0) {
   int i;
   for (i = 0; i < 10; i++) {
      printf("parent: %d\n", i);
      sleep(1);
   }
}
else {
   /* Error handling. */
   fprintf(stderr, "can't fork, error %d\n", errno);
   exit(1);
}
```

7. Write a C program using the fork() system call that generates the Fibonacci sequence in the child process. The number of the sequence will be provided in the command line.