EE472 Midterm
Name ______________________
SN __________

1: Suppose I have an 8-bit integer X. Write a line of C code that will:

Set its fourth bit to a one:
\[ a = a | 0x08; \]

Set its first bit to a zero:
\[ a = a & \lnot(1); \]

Set its last bit to its opposite:
\[ a = a \lnot 0x80; \]

2: Suppose you are logged into your beaglebone. What command (or group of commands) would you use to:

Get to your home directory:
\[ cd ~ \]

List the files in the current directory:
\[ ls \]

List the files in the current directory which contain “red” in their file names:
\[ ls | grep red \]

Compile the C program “workline.c” and name the executable file “WL”:
\[ gcc -o WL workline.c \]

Install the module “ledbank.ko” (no need to make a node for it):
\[ insmod ledbank.ko \]
3: Suppose there is a folder in your home directory named “Lock”, and inside that is a folder named “Key” and inside that is a file named “reg.txt”. Write the path of that file:

```
~/Lock/Key/reg.txt
```

Also, write a command that will show the contents of reg.txt if you are in your home directory.

```
cat Lock/Key/reg.txt
```

4: Suppose you have written a program that repeatedly scans /dev/datasource for new strings. It generates a text-to-speech synthesis of what you send it and plays it through a speaker. Write a line in bash that will trigger the module to say “Hello”.

```
echo "hello" > /dev/datasource
```

5: Suppose you have a GPIO pin that you want to use as an input. You have a normally-open switch and any power supply and/or resistors you need. The board you are using has no internal pull-up or pull-down resistors, so you will need to supply your own. Draw the schematic of this switch and its connections to the GPIO.

![Schematic](image)

6: Write declarations for:

A pointer to an integer:

```c
int *a;
```

A pointer to a pointer to a character:

```c
char ***b;
```

An array of 8 characters:

```c
char [8]c;
```
7: If you have written a function that you want to be called by the operating system, what information does the operating system need to receive from you to do this?

- pointer to this function
- information regarding when to call it

8: Suppose the datasheet for a digital Optical Character Recognition chip indicates data is retrieved "one bit at a time per positive edge of DCLK in groups of 8 bits, LSB first". Assuming you have a function that sets the value of DCLK and another that retrieves the value of the incoming bit, write code to receive one byte of data from this system. (You don't need to worry about setup or resets.)

```c
SDCLK(0);
for(i = 0; i < 8; i++)
{
    SDCLK(1);
    usleep(10);
    SDCLK(0);
    a = a + (DVal() << i);
    usleep(10);
}
```