CS 2750	**System Programming and Tools**	Test 2
Name:	Spring 2016	Maximum Points: 64

Important: This is an open book test. You can use any books, notes, or paper, but not exchange anything with other students. You are not allowed to use any electronic/communication device, including a calculator and e-books. *Do not log into the computer during the test. Change your cell phones to silent mode. Any other device with an* ON-OFF *switch should have its switch in the* OFF *position*. Any calculations and rough work can be done on the backside of the test pages. If there is a syntax error in any program segment, just point it out and you will get full credit for the problem. Please write legibly; if I cannot read what you wrote, I'll give you a zero. You will lose five points for not writing your name.

1. [6 pt] Why is it important to define the variable `PATH` in each shellscript? Under what circumstances should this variable be `export`ed?

2. [4 pt] What would be printed from the following statements:

```
x=21
echo ${x:=48}
```

   What will be the content of `x` after executing these statements?

3. [10 pt] Write a script that creates a temporary file in the directory `/tmp`. The script should write the username of the person who executes it inside the temporary file. It should sleep for 30 seconds and then, erase the file. Make sure that the file name is unique to each invocation of the script. Erase the file if the user generates an interrupt before the 30 second sleep time has expired.

4. [6 pt] Assume that a word is composed of only the alphabetic characters, both uppercase or lowercase. Give me a command to count the number of words in the file `foobar`.

5. [6 pt] Write the `awk` statement to print every odd-numbered line in the file `foobar` if that line contains more than 50 characters.

6. [10 pt] Write a function in `bash` that takes two integers and prints the maximum of the two integers on `stdout`. Verify that the two parameters are indeed integers. Each of the parameters should be less than 6 digits long; if the user enters a very long integer, it should be flagged as error.

7. [6 pt] Consider the following code:

```
#include <stdio.h>
#include <string.h>

int main()
{
    char str[6];
    memset ( str, '\0', sizeof ( str ) );
    str[1] = 'H';
    str[2] = 'e';
    str[3] = 'l';
    str[4] = 'l';
    str[5] = 'o';
    printf ( "The string contains: %s\n", str );
    return ( 0 );
```

What is printed by this code?

8. [6 pt] Use a bit operator to write a function that takes an integer as input and returns 1 if the integer is even. It should return 0 otherwise.

9. [10 pt] Give the C statements to open a file `foobar` for both read and write. Then, write three integers starting from the fourth element in the array defined as

   ```
   int arr[10];
   ```

   at the byte location 27 from the beginning of file.