University of Maryland Honor Pledge

The University is committed to Academic Integrity, and has a nationally recognized Honor Code, administered by the Student Honor Council. In an effort to affirm a community of trust, the Student Honor Council proposed and the University Senate approved an Honor Pledge. The University of Maryland Honor Pledge Reads:

“I pledge on my honor that I have not given or received any unauthorized assistance on this examination (or assignment)”

Please write the exact wording of the Pledge, followed by your signature, in the space below:

Pledge: ______________________________________________________________________________________
Pledge: ______________________________________________________________________________________
Pledge: ______________________________________________________________________________________
Pledge: ______________________________________________________________________________________

Your signature: ________________________________________________________________________________

Full Name: ________________________ Section: ________ Directory ID: __________________________

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<thead>
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<td>1</td>
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TOTAL (100):
Instructions:

• Make sure that your exam is not missing any sheets, then write your full name, your section and your Directory ID on the front.
• Write your answers in the space provided below the problem. If you make a mess, clearly indicate your final answer.
• The exam has a maximum score of 100 points.
• The problems are of varying difficulty. The point value of each problem is indicated. Pile up the easy points quickly and then come back to the harder problems.
• This exam is OPEN BOOK. You may use any books or notes you like. Calculators are allowed, but no other electronic devices. Good luck!

Problem 1. (16 points)
This problem tests your understanding of C types and C operations. Assume that variables a, b, c, d and e are defined as followed:

```
int a = 1;
int b = 3;
float c = 1;
float d = 2;
int e = 4;
```

Fill in all the empty cells in the table below. For each of the C assignment expressions in the left column, state the resulting value of the r2 – r9 variables.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>float r1 = c / d;</td>
<td>0.5</td>
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<tr>
<td>float r2 = a / (int)d;</td>
<td></td>
</tr>
<tr>
<td>int r3 = a % b;</td>
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<tr>
<td>unsigned r4 = UINT_MAX % 2;</td>
<td></td>
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<tr>
<td>int r5 = a &amp;&amp; b;</td>
<td></td>
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<tr>
<td>int r6 = e++;</td>
<td></td>
</tr>
<tr>
<td>int r7 = (a - (unsigned)b) &gt; 0;</td>
<td></td>
</tr>
<tr>
<td>float r8 = (a / b &gt; 0) ? c : d;</td>
<td></td>
</tr>
<tr>
<td>int r9 = b &gt;&gt; 1;</td>
<td></td>
</tr>
</tbody>
</table>
Problem 2. (10 points)
This problem tests your understanding of assignments, equality tests and if statements.
What is the output of the following code snippet?

```c
int a = 5;
if (a = 0)
    printf("a=0 is true. \n");
else
    printf("a=0 is not true.\n");
if (a==0)
    printf("a==0 is true. \n");
else
    printf("a==0 is not true.\n");
```

Problem 3. (12 points)
This problem tests your understanding of control flow. Considering the following code segment, what will be the values of i and k when the program exits the second for loop?

```c
for (i=0; i<=10; i=i+2) {
    if (i == 6)
        break;
    else i++;
}
for (k=0; k<=10; k=k+2) {
    if (k == 6)
        continue;
    else k++;
}
```

```
i = 10          k = 12
```
Problem 4. (8 points)
This program tests your understanding of strings. What is the output of the following code snippet? Write one character on each space, including the white space.

```
char s1[] = "ENEE 140 Final";
char s2[10] = "Exam";
s1[9] = '\0';
printf("%s%s", s1, s2);
```

__________

__________

Problem 5. (15 points)
This problem tests your understanding of command line arguments and of the switch statement. Fill in the blanks in the program on the next page in order to implement the following functionality:

• If there is only one command line argument, print out "You did not provide any input."
• If there are two arguments, print out "You are signed up for [argument 2]."
• If there are three arguments, print out "You are signed up for [argument 2] in the [argument 3] semester."
• If there are more than three arguments, print out "Too many arguments!"

Example invocations:
Command line invocation: a.out
output: You did not provide any input.
Command line invocation: a.out ENEE140
Output: You are signed up for ENEE140
Command line input: a.out ENEE140 Spring
Output: You are signed up for ENEE140 in the Spring semester.
Command line input: a.out ENEE140 Spring 2015
Output: Too many arguments!
The program:

```c
#include <stdio.h>

int main (int argc, char *argv[])
{

switch(_________)
{
    case 1:
        printf("You did not provide any input.\n");
        ______;
    case ___:
        printf("You are signed up for %s.\n",_______);
        ______;
    case ___:
        printf("You are signed up for %s in the %s semester.\n",____,____);
        ______;
        ______ : 
        printf("Too many arguments!\n");
    }

    return 0;
}
```
Problem 6. (5 points)
This problem tests your understanding of multi-dimensional arrays. Assume you have the following 2D array called data[8][8]:

```
1 0 1 0 1 0 1 0
1 0 1 0 1 0 1 0
1 0 1 0 1 0 1 0
1 0 1 0 1 0 1 0
1 0 1 0 1 0 1 0
1 0 1 0 1 0 1 0
1 0 1 0 1 0 1 0
1 0 1 0 1 0 1 0
```

What would the value of variable sum be at the end of this segment of code?

```cpp
for(i=0;i<8;i++){
    for(j=0;j<8;j++){
        if(i==j)
            sum=sum+data[i][j];
    }
}
```
Problem 7. (16 points)

This problem tests your understanding of characters and strings. Fill in the blanks of the following code to prompt the user for the string first and change the string first to all capital letters and print out the result. Assume all 8 spaces are filled with characters but not necessarily letters. If there is a non-letter in the string, ignore it and continue to the next character.

There should be 8 blanks to fill.

```c
char first[____];
printf("What is your first name?\n");
scanf("%____",____);
int i;
for(i=0;i<_____;i++) {
    if(first[i]>=_____ && first[i]<=_____) {
        first[i] = ______;
    }
}
printf("%____",first);
```
Problem 8. (15 points)

This problem tests your understanding of random numbers and control flow.

A. In the blank space from the code below, write a statement that generates a random odd number between 20–40 and assigns it to variable r:

```c
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

int main()
{
    srand(time(NULL));

    int nums[10];
    int i, r, j, f;

    for (i=0; i<10; i++) {
        f=0;
        r=__________________________; // <-- WRITE YOUR STATEMENT HERE
        if (i==0) {
            nums[i]=r;
        }
        else {
            for (j=0; j<i; j++) {
                if (nums[j]==r)
                    f=1;
            }
            if (f==0) {
                nums[i]=r;
            }
            else
                i--;
        }
    }

    for (i=0; i<10; i++)
        printf("%d -> %d\n", i, nums[i]);

}
```
B. State in plain English the purpose of this program. In your explanation, include the purpose of variable \( f \).