Midterm Exam II

Engineering Problem Solving II, 59:006

(Version A)

Name: _____________________

Section: _____________ (1 point)

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Section Mtg. Time

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Cheating. Cheating is defined as fraud, deceit, or dishonesty in an academic assignment, or using or attempting to use materials, or assisting others in using materials that are prohibited or inappropriate in the context of the academic assignment in question, such as:

- Copying or attempting to copy from others during an exam.
- Communicating answers with another person during an exam.
- Preprogramming a calculator to contain answers or other unauthorized information for exams.
- Using unauthorized materials, prepared answers, written notes, or concealed information during an exam.
- Taking an exam for another person or having someone take an exam for oneself.
- Sharing information about the contents of an exam to aid another student who has not yet taken the exam.

I hereby certify that I have not cheated on this exam: _____________________ (1 point)
Question 1) (5 points)

Identify and correct the errors in the following code fragment, given the correct output (%p is used to print a pointer):

```c
int y = 3;
int *yptr;
yptr = &y;
printf("The value of y is %d\n", *yptr);
printf("The address of y is %p\n", *yptr);
```

Change "*yptr" in the above statement to "yptr" or "&y"

Output:
The value of y is 3
The address of y is 2063865468

Question 2) (5 points)

Which line of code prints the following output?

The value of Tommy’s grade point average is: 3.26

a) `printf("The value of %s grade point average is %4.2f\n", "Tommy's", 3.2632);`
b) `printf("The value of %c grade point average is %2.3f\n", "Tommy's", 3.2632);`
c) `printf("The value of %c grade point average is %3.2f\n", "Tommy's", 3.2632);`
d) `printf("The value of %s grade point average is %4.3f\n", "Tommy's", 3.2632);`

Answer ___________ a) ___________

1
Question 3) (15 points)

The function getUserInput(.) collects three variables from the user: an int, a float and a string.

Fill in the code fragment to complete the program.

1. Matching prototype and function (5 points)
2. Pass by reference (5 points)
3. Passing all necessary arguments (5 points)

```
#include <stdio.h>

void getUserInput( float *num1, int *num2, char *string ); //function prototype

int main( void )
{
    int min;
    float max;
    char myString[125];
    getUserInput( &max, &min, myString ); //Function call
    printf(“The Minimum is %f\n”, min);
    printf(“The Maximum is %d\n”, max);
    printf(“The String is %s\n”, myString);
    return 0;
}

void getUserInput( float *num1, int *num2, char *string ) // function header
{
    printf(“Enter a floating point number, an integer and a word less than 124 characters.\n”);
    scanf(“%f%d%s”, num1, num2, string);
    return;
}
```
Question 4) (6 points)

```c
#include <stdio.h>
int main(void) {
    int i = 0, j = 5;
    for( i = 0; i <= 4; i++ ) {
        j = j + i;
    }
    printf( "The final value of j is %d.\n", j );
    return 0;
}
```

Which of the following will the program print? (Circle One)

a) The final value of j is 11.
b) The final value of j is 14.
c) The final value of j is 15.
d) The final value of j is 16.

Answer __________ c) __________

Question 5) (6 points)

What is the output of the following code?

```c
#include <stdio.h>
int main() {
    int x = 1, y=1, sum = 0;
    while(x<3)
    {
        sum = x+ y;
        x = y;
        y  =  sum;
    }
    printf ("The sum is %d\n", sum);
    return 0;
}
```

a) The sum is 2
b) The sum is 3
c) The sum is 5
d) The sum is 8

Answer ________ c) __________
Question 6) (14 points)

Write the output produced by the following program.

```c
#include <stdio.h>
#define SIZE 4
struct values {
    int one;
    int two;
};

int main(void)
{
    struct values myValues[SIZE];
    int i;

    for (i=0; i<SIZE; i++) {
        myValues[i].one = i%2;
        myValues[i].two = (i/2)%2;
    }

    for (i=0; i<SIZE; i++)
        printf("i=%d: %d %d\n", i, myValues[i].two, myValues[i].one);

    return 0;
}
```

0 : 0 0
1 : 0 1
2 : 1 0
3 : 1 1

Answer __________________
Question 7) (16 points)

Write a fragment of C code that opens a file (integers.dat) with read only access, and then reads 10 integers, stores them in an array (int array[]), and closes the file.

```c
int main(void)
{
    FILE *fp;
    int i;
    int array[10];
    if ((fp = fopen("integers.dat", "r") == NULL)
    {
        printf("File could not be opened.\n");
        return -1;
    }
    else{
        for( i=0; i<10; i++)
            fscanf(fp, "%d", &array[i]);
        fclose(fp);
    }
    return 0;
}
```
Question 8) (16 points)

Given the following program:

```c
int next(int current);
int main()
{
    int series = 1; /* Start at 1 */

    while(series != 0)
    {
        series = next(series);
        printf("  series = %d", series);
    }
    return 0;
}
```

The correct output should be:

```
series = 1  series = 2  series = 0
```

Two engineers have come up with different implementations for `next()`. One, both, or none may have the correct behavior. Fill out the table to the right to indicate the return values for each input.

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<th>In</th>
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<td>3</td>
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<tr>
<td>3</td>
<td>0</td>
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</tbody>
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/* Version A */
```c
int next(int current) {
    int next_num;
    next_num = current + 1;
    if (next_num == 3) {
        next_num = 0;
    }
    return next_num;
}
```

/* Version B */
```c
int next(int current) {
    if (current >= 2)
        return 0;
    return (current);
}
```

__F___ (T/F) Does version A have the correct behavior (3 points)
__F___ (T/F) Does version B have the correct behavior (3 points)

If the following code segment were executed what would the value of series be? (2 points)
```
series = next(7);
```

Function version A : series = _____8_____
Function version B : series = _____0_____
Question 9) (15 points)

There are five errors in the following code. Only five corrects are required and the compiler prints out the following message:

file.c: In function `main':
file.c:11: warning: int format, double arg (arg 2)
file.c:12: warning: control reaches end of non-void function
file.c: At top level:
file.c:14: conflicting types for `calcMean'
file.c:2: previous declaration of `calcMean'
file.c: In function `calcMean':
file.c:17: `i' undeclared (first use in this function)
file.c:18: `array' undeclared (first use in this function)
file.c:20: parse error before `}''

Find and change the five lines of code that caused these errors.

```
#include <stdio.h>
float calcMean(float [], int);

int main(void){
   int i;
   float mean, numbers[100];

   for(i = 0; i < 100; i++)
      numbers[i] = i;
   mean = calcMean(numbers, 100);
   printf("The mean of array numbers is: %f\n", mean); change %d to %f
   return 0;
 }

float calcMean(float *array, int size){
   float sum = 0;
   int i;
   for(i = 0; i < size; i++)
      sum = sum + array[i];
   return sum/size;
 }
```