ECEn 224: C Homework

1. (1 point) What does the `#include` preprocessor directive do?

2. (1 point) What is the value of `sizeof(char)`? `sizeof(int)`? `sizeof(int32_t)`?

3. (1 point) What function is the starting point for all C programs?

4. (1 point) What are the two kinds of comments in C?

5. (1 point) What does the following code print?

```c
#include <stdio.h>

int x = 1;

void print_number() { printf("%d\n", x); }

int main() {
    int x = 2;
    printf("%d\n", x);

    {
        int x = 3;
        printf("%d\n", x);
    }

    print_number();
}
```

6. (1 point) What does the following code print?

```c
#include <stdio.h>

#define PLUS1 x + 1

int main() {
    int x = 10;
    int y = 5 * PLUS1;
    printf("%d\n", y);
}
```

7. (1 point) What is the name of the mystery function shown below? Hint: it is a standard library function.

```c
int mystery(char s[]) {
    int i = 0;
    while (s[i] != '\0') {
        ++i;
    }
    return i;
}
```

8. (1 point) What does the code below print out?

```c
#include <stdio.h>

int main() {
    enum {hello=3, goodbye} myEnum = goodbye;
    printf("%d\n", myEnum);
}
```

9. (1 point) What does the following program print out?

```c
#include <stdio.h>

int main() {
    printf("%d\n", '1');
}
```

10. (1 point) What does the following program print out?

```c
#include <stdio.h>

int main() {
    printf("%d\n", "13");
}
```

11. (1 point) What does the following program print out?

```c
#include <stdio.h>

int main() {
    printf("%.*s", 5, "hello there\n");
}
```

12. (1 point) What does the following program print out?

```c
#include <stdio.h>

int main() {
    char array[20];
    sprintf(array, "%s", "hello there!");
}
```

13. (1 point) What does the following program print when executed and when you type 2 2 2 and press enter (or carriage return)?

```c
#include <stdio.h>

int main() {
    int month, day, year;
    printf("%d\n", scanf("%d %d %d", &month, &day, &year));
}
```

14. (1 point) What does the following program print when executed? Why?

```c
#include <stdio.h>
#include <string.h>
#define LENGTH 100
int main() {
    char string1[LENGTH] = "hello ";
    char string2[LENGTH] = "there";
    strcpy(string1, string2);
    printf("%s\n", string1);
}
```

15. (1 point) What does the following program print when executed? Why?

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

#define LENGTH 100

int main() {
    char string1[LENGTH] = "hello ";
    char string2[LENGTH] = "there";
    strcat(string1, string2);
    printf("%ld\n", strlen(string1));
}
```

16. (1 point) What does the program below print out?

```c
#include <stdio.h>

int main() {
    int i = 9;
    int j = ((0 > 1) && (i=14));
    printf("%d\n", i);
}
```

17. (1 point) What does the program below print out?

```c
#include <stdio.h>

int main() {
    int i = 9;
    int j = ((0 > 1) || (i=14));
    printf("%d\n", i);
}
```

18. (1 point) What does the following program print out?

```c
#include <stdio.h>

int main() {
    int i = 0 < 1;
    printf("%d\n", i);
}
```

19. (1 point) What does the following program print out?

```c
#include <stdio.h>
#include <math.h>

int main() {
    int n = 16;
    printf("%d\n", sqrt(n));
}
```

20. (1 point) What does the following program print out?

```c
#include <stdio.h>

int main() {
    int j = 4;
    printf("%d\n", j++);
    printf("%d\n", ++j);
}
```

21. (1 point) What is the value printed out by the program shown below?

```c
#include <stdio.h>

int main() {
    printf("%d\n", 0xf0 | 0xf == 0xff);
}
```

22. (1 point) What is the value printed out by the program shown below?

```c
#include <stdio.h>

int main() {
    printf("%d\n", (0xf0 | 0xf) == 0xff);
}
```

23. (1 point) If you decare an array like this: `int values[10]={3};`, what is the value of `values[5]`?

24. (1 point) If you have an array `uint32_t vals[10]`, what is the value of `sizeof(vals)`?

25. (1 point) If you declare a string (char array) like this: `char str[10] = "hi";`, what is the size of the array (in bytes)? What is returned by `strlen(str)`?

26. (1 point) Are these two if statements equivalent? Why or why not?

```
if (x) {
    ...
}

if (x == 1) {
    ...
}
```

27. (1 point) Are these two if statements equivalent? Why or why not?

```
if (x) {
    ...
}

if (x != 0) {
    ...
}
```

28. (1 point) How many times will this program print out the statement "did nothing"?

```
#include <stdio.h>

int main() {
    int i = 10, j;
    if (i >= 0) {
        for (j = 0; j < i; j++) {
            if (j == 10) {
                printf("%d\n", j);
                return i;
            } else {
                printf("did nothing.\n");
            }
        }
    }
}
```

29. (1 point) What will the following program will print out?

```c
#include <stdio.h>

int main() {
    int x = 10;
    if (x > 0)
        printf("1\n");
    else if (x > 1)
        printf("2\n");
    else if (x > 2)
        printf("3\n");
    else
        printf("4\n");
}
```

30. (1 point) What is the last thing this program will print?

```c
#include <stdio.h>

int main() {
    int x = 0;
    for (;;) {
        printf("%d\n", x++);
        if (x > 2)
            break;
    }
}
```

31. (1 point) How many times will this program print "hi!"?

```c
#include <stdio.h>

int main() {
    int i = 0;
    do
        printf("hi!\n");
    while (i);
}
```

32. (1 point) How many times will this program print "hi!"?

```c
#include <stdio.h>
int main() {
    while (1) {
        printf("hi!\n");
        break;
    }
}
```

33. (1 point) How many times will this program print "hi!"?

```c
#include <stdio.h>

int main() {
    while (1) {
        printf("hi!\n");
        continue;
    }
}
```

34. (1 point) How many times will this program print "hi!"?

```c
#include <stdio.h>

int main() {
    int i;
    for (i = 0; i < 10; i++) {
        if (i % 2)
            continue;
        printf("hi!\n");
    }
}
```

35. (1 point) How many times will this program print "hi!"?

```c
#include <stdio.h>

int main() {
    int i;
    for (i = 0; i < 10; i++) {
        if (i % 2)
            break;
        printf("hi!\n");
    }
}
```

36. (1 point) What value with the program print?

```c
#include <stdio.h>

int main() {
    int x=4;
    int *y = &x;
    y++;
    printf("%d\n", *y);
}
```

37. (1 point) What value with the program print?

```c
#include <stdio.h>

int main() {
    int x = 4;
    int y = &x;
    y++;
    printf("%d\n", y++);
}
```

38. (1 point) What value will the program print?

```c
#include  <stdio.h>

int main() {
    int x = 4;
    int* y = 5;
    y++;
    y++;
    printf("%d\n", y++);
}
```

39. (1 point) What value will the program print?

```c
#include <stdio.h>

int main() {
    int x = 4;
    int* y = &x;
    (*y)++;
    printf("%d\n", y);
}
```

40. (1 point) What value will the program print?

```c
#include <stdio.h>

int main() {
    int x = 4;
    int* y = &x;
    (*y)++;
    printf("%d\n", *y++);
}
```

41. (3 points) Write a C program that given a 32-bit number that represents an RGB value, prints out the red, green, and blue values.

```c
#include <stdio.h>

int main() {
    // Your code should work for any value of rgb.
    uint32_t rgb = 0x60B3BE;

    // You need to fill in these values using the code below
    uint8_t red;
    uint8_t green;
    uint8_t blue;

    // Put your code here...









    // Print out the result
    printf("red: %d\n", red);
    printf("green: %d\n", green);
    printf("blue: %d\n", blue);
}
```

42. (5 points) Write a homework question that you think would be good for future students to answer to help them learn more about what has been covered in lecture so far.