

COP 3223 Section 3

Final Exam

Form A

Fall 2010

12/8/2010

Lecturer: Arup Guha

Directions: Answer all multiple choice questions on the scantron. Each question has a single correct answer. In case of ambiguities, choose the most accurate answer. Each of these questions is worth 2 points for a correct answer. Incorrect answers and questions left blank are worth 0 points. Hand in **ONLY** the scantron, keep the test questions, and take the free response section of the exam.

NOTE: For **ALL** questions, choice E is “None of the Above”. This choice **IS** a possible answer for each question.

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Please refer to the following code when answering questions 1 through 3:

```
#include <stdio.h>

int main() {

    int a = 5, b = 7, c = 2;
    a = 2*b + c;
    printf("a = %d, b = %d, c = %d\n", a, b, c);
    b = 2*c + a;
    printf("a = %d, b = %d, c = %d\n", a, b, c);
    c = 2*a + b;
    printf("a = %d, b = %d, c = %d\n", a, b, c);
    return 0;
}
```

1) What is the first line of output of the program above?

- | | |
|------------------------|-------------------------|
| a) a = 5, b = 7, c = 2 | b) a = 16, b = 7, c = 2 |
| c) a = 9, b = 7, c = 2 | d) a = 12, b = 7, c = 2 |

2) What is the second line of output of the program above?

- | | |
|--------------------------|-------------------------|
| a) a = 16, b = 9, c = 2 | b) a = 9, b = 9, c = 2 |
| c) a = 16, b = 20, c = 2 | d) a = 16, b = 9, c = 7 |

3) What is the third line of output of the program above?

- | | |
|---------------------------|---------------------------|
| a) a = 16, b = 9, c = 17 | b) a = 16, b = 9, c = 41 |
| c) a = 16, b = 20, c = 49 | d) a = 16, b = 20, c = 56 |

4) What is the output produced by the code segment below?

```
int a = 3, b = 7;
if (2*a > b || b < 3*a)
    printf("A");
if (2*a > b && b < 10*a)
    printf("B");
else
    printf("C");
```

- a) A b) B c) AB d) AC

5) What is the output produced by the code segment below?

```
int a = 4, b = 6;
if (a > b)
    if (!b)
        printf("A");
else
    printf("B");
printf("C");
```

- a) A b) B c) AC d) BC

6) What is the output produced by the code segment below?

```
int grade = 88;
if (grade >= 60) printf("D");
if (grade >= 70) printf("C");
if (grade >= 80) printf("B");
if (grade >= 90)
    printf("A");
else
    printf("F");
```

- a) DCBF b) DCB c) B d) D

7) What is the output produced by the code segment below?

```
int i, sum;
sum = 0;
for (i=3; i<10; i+=3)
    sum += i;
printf("i = %d, sum = %d\n", i, sum);
```

- a) i = 9, sum = 9 b) i = 9, sum = 18
c) i = 12, sum = 18 d) i = 12, sum = 30

8) What is the output produced by the code segment below?

```
int i, sum;
sum = 0;
for (i=3; i<10; i+=3); // Last semicolon is intentional.
    sum += i;
printf("i = %d, sum = %d\n", i, sum);
```

- a) i = 9, sum = 9 b) i = 12, sum = 12

c) $i = 12$, $\text{sum} = 18$

d) $i = 12$, $\text{sum} = 30$

Please refer to the following code when answering questions 9 through 12:

```
#include <stdio.h>

void f(int array[], int length);

int main() {
    int array[] = {6, 2, 17, 5};
    f(array, 4);
    int i;
    for (i=0; i<4; i++)
        printf("%d\n", array[i]);
    return 0;
}

void f(int array[], int length) {

    int i;
    for (i=0; i<length-1; i++) {
        array[i+1] = array[i+1] + array[i];
        array[i] = array[i+1] - array[i];
    }
}
```

9) What is the first line of output of the program above?

- a) 2 b) 5 c) 6 d) 17

10) What is the second line of output of the program above?

- a) 2 b) 8 c) 17 d) 25

11) What is the third line of output of the program above?

- a) 17 b) 23 c) 25 d) 30

12) What is the fourth line of output of the program above?

- a) 17 b) 23 c) 25 d) 30

Please refer to the following code when answering questions 13 through 16:

```
#include <stdio.h>

int f(int a, int b);

int main() {

    int a = 7, b = 3;
    b = f(b, a);
    printf("a = %d, b = %d\n", a, b);
    a = f(a+b+2, a-b+1);
    printf("a = %d, b = %d\n", a, b);
    return 0;
}

int f(int a, int b) {
    int temp = a*b - a - b;
    a = temp - a;
    b = a - b;
    printf("a = %d, b = %d\n", a, b);
    return a*(b+2)%temp;
}
```

13) What is the first line of output of the program above?

- a) a = 7, b = 3 b) a = 7, b = 1
c) a = 8, b = 1 d) a = 8, b = 3

14) What is the second line of output of the program above?

- a) a = 7, b = 2 b) a = 7, b = 3
c) a = 8, b = 2 d) a = 8, b = 3

15) What is the third line of output of the program above?

- a) a = 38, b = 30 b) a = 38, b = 34
c) a = 44, b = 35 d) a = 44, b = 37

16) What is the fourth line of output of the program above?

- a) a = 7, b = 2 b) a = 7, b = 3
c) a = 18, b = 2 d) a = 18, b = 3

Please refer to the following code when answering questions 17 through 20:

```
#include <stdio.h>

int f(int* a, int* b);

int main() {

    int a = 7, b = 3;
    b = f(&b, &a);
    printf("a = %d, b = %d\n", a, b);
    a = f(&a, &b);
    printf("a = %d, b = %d\n", a, b);
    return 0;
}

int f(int* a, int* b) {
    int temp = (*a)*(*b) - (*a) - (*b);
    *a = temp - (*a);
    *b = (*a) - (*b);
    printf("a = %d, b = %d\n", *a, *b);
    return (*a)*((*b)+2)%temp;
}
```

17) What is the first line of output of the program above?

- a) a = 7, b = 3 b) a = 7, b = 1
c) a = 8, b = 1 d) a = 8, b = 3

18) What is the second line of output of the program above?

- a) a = 1, b = 2 b) a = 7, b = 2
c) a = 8, b = 1 d) a = 7, b = 3

19) What is the third line of output of the program above?

- a) a = -2, b = -4 b) a = -3, b = -4
c) a = -2, b = -5 d) a = -3, b = -5

20) What is the fourth line of output of the program above?

- a) `a = 0, b = -4` b) `a = 1, b = -5`
c) `a = 1, b = 2` d) `a = 2, b = 2`

21) Which of the following is a valid struct definition?

- a)

```
struct f {  
    int 2num;  
    char c;  
};
```

 b)

```
struct f(int n, char c);
```

 c)

```
struct f {  
    int n;  
    char c;  
};
```


d)

```
struct f {  
    struct f g;  
    char c;  
};
```

22) Let the struct block have components number (int) and letter (char). Let p be a pointer to a struct block. Which of the following correctly adds 1 to the number component of the block pointed to by p?

- a) `p.number+1;` b) `p->number+1;` c) `p.number++;` d) `p->number++;`

23) Which of the following functions allows us to dynamically allocate memory in C for a node in a linked list?

- a) `free` b) `malloc` c) `newmem` d) `constructor`

24) Which of the following is an indicator that a pointer is pointing to nothing?

- a) `nada` b) `nothing` c) `zero` d) `NULL`

25) SpaceX's Falcon 9 rocket launched from Kennedy Space Center this morning, signaling an important milestone in the direction of commercial space travel. After what US President is Kennedy Space Center named?

- a) Kennedy b) Johnson c) Reagan d) Bush e) Obama

Fall 2010 COP 3223 Section 3
Final Exam Free Response Answer Sheet

Last Name: _____, **First Name:** _____

Note: Declare any extra variables you need to for each problem.

1) (10 pts) Arup has decided that he's going to create his own newspaper to rival the in town Sentinel. You are working in his subscriptions department and he's asked you to write a program that calculates the cost of a subscription. The cost of a Sunday paper is \$2.00 while the paper costs \$1.25 on all other days. All subscriptions start on Monday. Your program should prompt the user with the number of days they want for their subscription and output the total cost of their subscription. (For example, a 7 day subscription costs \$9.50 and an 8 day subscription costs \$10.75.) Fill in the program below to complete this task.

```
#define REG_COST 1.25
#define SUN_COST 2.00
#define REGDAYS_WEEK 6

int main() {

    int sub_length;
    double total_cost = 0;
    printf("How long do you want to subscribe?\n");
    scanf("%d", &sub_length);


    printf("Your subscription will cost $%.2lf.\n", total_cost);
    return 0;
}
```

2) (10 pts) Write a segment of code that reads in a positive integer from the user greater than 1 and determines whether or not that value is prime. Part of the code is provided:

```
int n, prime = 1;
printf("Enter a positive integer greater than 1.\n");
scanf("%d", &n);
```

```
if (prime)
    printf("%d is prime.\n", n);
else
    printf("%d is NOT prime.\n", n);
```

3) (10 pts) Write a function that takes in an array of stock values for a set of consecutive days and determines the greatest change between two successive days. The two parameters to the function will be the array of values and the length of the array. (For example, if the array contained 9, 8.75, 9.25, 8, and 8.50, the function should return 1.25, because the change between day 2 and day 3 was $|8 - 9.25| = 1.25$.) The array length is guaranteed to be greater than 1.

```
double maxChange(double values[], int length) {
```

```
}
```

4) (10 pts) Write a function that takes in a pointer to the front of a linked list and **exchanges the values** stored in the first and last nodes of the list. If the list has fewer than 2 nodes, nothing should be done.

```
struct ll {  
    int data;  
    struct ll* next;  
};
```

```
void swapFirstLast(struct ll* list) {
```

```
}
```

5) (10 pts) A pack of dice is characterized by two values: the number of dice, and the number of sides on each of the dice. In the game of Monopoly, for example, we use 2 dice with 6 sides each. (We assume the sides are labeled 1 through n, where n is the number of sides on each dice.) In this question you will write a couple functions related to the pack of dice, which will be stored in a struct shown below. Assume that the random number generator has already been seeded and that calls to rand() will produce random numbers in between 0 and 32767. Write the two functions according to the specifications given.

```
struct packofdice {
    int numdice;
    int numsides;
};

// Returns the sum of the dice on a simulated roll of all
// of the dice pointed to by thispack.
int roll(const struct packofdice* thispack) {

}

// Returns the maximum possible value that could arise from
// the sum of all the dice in the pack pointed to by thispack.
int maxval(const struct packofdice* thispack) {

}
```