

There are 20 questions for a total of 100 points.
 Questions 1-15 are multiple choice (4 points each); 16-20 are short answers (8 points each).
 Partial credit up to 2 points may be granted in Questions 16-20.
 Please write the answer that you think is most appropriate. Assume all variables are properly declared.

Name:

Student ID:

Grade: + =

1- (4 points) Which of the following is a valid variable name?

- (a) while
- (b) _id_2
- (c) 5thAve
- (d) 'x'

2- (4 points) Which of the following is a valid declaration?

- (a) double case;
- (b) float a, b, c;
- (c) int double;
- (d) char xy; yz; xz;

3- (4 points) Which of the following is a valid statement?

- (a) if (y <= 5) then a = 3;
- (b) 12 = x - y;
- (c) if (x <= 3) x += 2; else { }
- (d) if (y) then y;

4- (4 points) What would be displayed by the following program segment?
(The symbol '\$' stands for one blank character.)

```
double a, b;
a = 147.56;
b = 101.845;
printf("Is it%8.3f%6.1f", a, b);
printf("?\n");
```

- (a) Is\$\$it147.560\$101.8?
- (b) Is\$it\$147.560\$101.8?
- (c) Is\$it\$147.56\$101.845?
- (d) Is\$it\$147.56\$\$\$101.8?

5- (4 points) The expression

$$x /= a - b * y;$$

is equivalent to

- (a) $x = x / a - b * y;$
- (b) $x = (x / a) - b * y;$
- (c) $x = x / (a - b) * y;$
- (d) $x = x / (a - b * y);$

6- (4 points) What is the value of the variable x after the following program fragment is executed?

```
double x;
x = 15 / 6;
```

- (a) 2.0
- (b) 3.0
- (c) 2.5
- (d) 3.5

7- (4 points) What is the output of the segment below?

```
int a;
a=3;
switch(a) {
    case 2: printf("i");
    break;
    case 3: printf("ii");
    case 4: printf("zz");
    break;
    default: printf("iii");
}
```

- (a) i
- (b) ii
- (c) iiiii
- (d) iizz

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- 8- (4 points) How does the value of y relate to the value of a at the end of

```
y = -10;
if ( a >= 0 ) y = a; else y = 0 - a;
```

- (a) The value of y is constant.
 (b) The value of y is equal to the value of a .
 (c) The value of y is the absolute value of a .
 (d) The value of y is zero.

- 9- (4 points) Which of the following assigns 10 to a ?

- (a) $x = 9; a = x++;$
 (b) $x = 9; a = ++x;$
 (c) Both (a) and (b)
 (d) None of the above

- 10- (4 points) For what exact range of values of variable x does the following code segment display the letter 'C'?

```
if (x <= 20){
    if (x <= 10){
        if (x==10) printf("C\n");
        if (x<=0) printf("A\n");
    }
    else{
        printf("C\n");
    }
} else{
    printf("D\n");
}
```

- (a) $0 < x < 10$
 (b) $x <= 20$
 (c) $10 <= x <= 20$
 (d) $10 < x <= 20$

- 11- (4 points) How many lines of output will be displayed by the following program fragment?

```
for (i = 0; i < 5; i = i + 1)
    for (j = 0; j <= i; j = j + 1)
        printf("%d %d\n", i, j);
```

- (a) 20
 (b) 15
 (c) 10
 (d) 9

- 12- (4 points) What is the output of the following program fragment?

```
int x = 5;
if ( (x - 3) * 2 - 4 ) {
    printf ("a %d\n", ++x);
} else {
    printf ("b %d\n", ++x);
}
```

- (a) a 5
 (b) a 6
 (c) b 5
 (d) b 6

- 13- (4 points) Which of the following best describes the behaviour of the following program fragment?

```
int i;
printf("BEGIN\n");
for (i=0;i<10;i--) { }
printf("END\n");
```

- (a) It outputs both BEGIN and END on standard output.
 (b) It outputs only END on standard output.
 (c) It outputs BEGIN on standard output and goes into an infinite loop (program runs forever)
 (d) None of the above

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14- (4 points) How many of the expressions below evaluate to TRUE, if *a is 5, b is 10, c is 15* and *flag is 1*?

- i. `c == a + b && flag`
- ii. `b != 5 && !flag || c >= 13`
- iii. `!(a==b && b==c || c==15)`
- iv. `(a || b) && c`

- (a) 1
- (b) 2
- (c) 3
- (d) 4

15- (4 points) If the input to the following program segment is 35, what is its output?

```
scanf("%d", &s);
if (s >= 40)
    printf("A ");
else if (s >= 20)
    printf("B ");
if (s >= 30)
    printf("C ");
else
    printf("D ");
```

- (a) A
- (b) B
- (c) B C
- (d) C

16- (8 points) Fill in the missing statement for a program that takes as input the weekday for the first day of a particular month (e.g. 0 for Monday, 1 for Tuesday, 2 for Wednesday, ...), the current day of the month (an integer between 1 and 31) and outputs as text the corresponding day of the week for the current date. You are given the following incomplete code. Please fill in the box with an appropriate code fragment. A sample execution is as follows:

Input:

2
18

Output:

Saturday

(The first input parameter implies that the first day of this particular month is 'Wednesday'. The second input parameter implies that today is the 18th. Finally the output displays as text the day of the week for 18th, which is a 'Saturday'.)

```
int firstDay, today;
```

```
printf("Which weekday is the first day of the month (0-6)?\n");
printf("0 - Monday\n");
printf("1 - Tuesday\n");
printf("2 - Wednesday\n");
printf("3 - Thursday\n");
printf("4 - Friday\n");
printf("5 - Saturday\n");
printf("6 - Sunday\n");
```

```
scanf("%d", &firstDay);
```

```
printf("What day is today (1-31)?\n");
scanf("%d", &today);
```

```
switch (
```

ANSWER:

```
)
```

```
{
    case 0: printf("Monday\n"); break;
    case 1: printf("Tuesday\n"); break;
    case 2: printf("Wednesday\n"); break;
    case 3: printf("Thursday\n"); break;
    case 4: printf("Friday\n"); break;
    case 5: printf("Saturday\n"); break;
    case 6: printf("Sunday\n"); break;
}
```

17- (8 points) Using repetition and loops (e.g. while, for, do-while, etc.) write a program that displays as output the following triangle. (You will receive 0 points if you implement your program with anything but repetition and loops.)

*	*	*	*	*	*	*	*	*
	*	*	*	*	*	*	*	
		*	*	*	*	*		
			*	*	*			
				*				

ANSWER:

- 18- (8 points) The following program calculates the factorial of a given number. Please fill in the boxes with appropriate code segments. You are not allowed to make modifications on any other places in the program. [Mathematically, $n! = n(n-1)(n-2) \dots 1$]

```

int number, i;
int fact = 1;
printf("Number?\n");
scanf("%d", &number);

for (i=0; i<=number; i++){

    if (  )
    {
        
    }
}
printf("The factorial for %d is %d\n", number, fact);

```

- 19- (8 points) You are trying to swap the values of two variables x and y. Please briefly explain (with at most two sentences) why the following code fragment *would not* work. What would be the final values of x and y after program execution?

```

int x = 5;
int y = 10;
x = y;
y = x;

```

ANSWER:

- 20- (8 points) Rewrite the following code fragment using the *while* statement:

```

int i;
for (i = 0; i<10; i++){
    printf("%d", i);
}

```

ANSWER:

A

A

A

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