SYSC2006A, Midterm 1, Late Summer 2013, 1h20m

Circle exactly one answer for each multiple-choice question. In cases where there is more than once correct answer, select the most correct/precise answer. Write your name and student number on the top of this question sheet. For non multiple choice questions, write only in the spaces provided. After 1h and 20min finishes, submit only the exam sheets that you received. Questions 12 and 22 are worth 2 points. All the other questions are worth 1 point.

1. What will be printed by this program?

```
#include<stdio.h>
int main(void){
  int x=5;
  double y=20.0, z;
  z=1+x/y;
  printf("%f", z);
  return(0);
}
```

(a) 0.0 (b) 0.25 (c) 1.0 (d) 1.25
(e) unpredictable

2. Which of the following statements is correct about the below C-program?

```
#include<stdio.h>
int main(void){
  int x=5;
  if(x<10)
    printf("i am less than 10");
  else if(x<=8)
   printf("i am less than equal to 8");
  else
    printf("what am i?");
  return(0);
}
```

(a) Only the first `printf` call is executed.
(b) Only the second `printf` call is executed.
(c) The first and the second `printf` calls are executed.
(d) All three `printf` calls are executed.
(e) None of the above

3. What will be printed by this program?

```
#include<stdio.h>
int main(void){
  int x=7, sum=0;
  while(x!=3)
```

```
    {
      sum=sum+x;
      x--;
    }
  printf("%d", sum);
  return(0);
}
```

(a) 0 (b) 18 (c) 22 (d) 25

(e) the program goes into infinite loop

4. What will be printed by this program?

```
#include<stdio.h>
int main(void){
    int a=100, b=200, c;
    c = (a == 100 || b > 200);
    printf("c=%d", c);
    return(0);
}
```

(a) c=100 (b) c=200 (c) c=1 (d) c=0

(e) unpredictable

5. Which of the following statements is correct about the below C-program?

```
#include<stdio.h>
int main(void){
  char x, y;
  x='a';
  y='f';
  printf("%c %d", x,y);
  return(0);
}
```

(a) It prints two letters

(b) It prints two numbers

(c) It prints a letter followed by a number

(d) It prints a number followed by a letter

(e) It is unpredictable what it will print

6. The reserved word used to transfer control from a function back to the calling function is

(a) void

(b) return

(c) goto

(d) None of the above

7. What will be printed by the following program?

```
#include<stdio.h>
int main(void){
    int a=10, b=20;
    double c;
    c = (double)(a/b);
    printf("c=%f", c);
    return(0);
}
```

(a) c=10.0 (b) c=0.0 (c) c=0.5 (d) c=20.0

(e) unpredictable

8. Which of the following statements is correct about the following C-program?

```
#include<stdio.h>
int main(void){
    int x = 10, y = 100%90, i;
    for(i=0; i<5; i++){
      if(x!=y)
        printf("x=%d, y=%d ", x,y);
    }
    return(0);
}
```

(a) The `printf()` function is called 4 times.

(b) The `printf()` function is called 5 times.

(c) The `printf()` function is called 6 times.

(d) The `printf()` function is never called.

(e) The program does not compile.

9. Write, in the rectangle below, a prototype of a function called `are_equal` that takes as an input two integers and one double number and returns a letter 'y' if all three numbers all equal and a letter 'n' otherwise.

10. Write, in the rectangle below, a prototype of a function called `lines` that takes as input an integer `x` and a character and prints `x` times that character.

11. Which of the following statements is correct about the following function?

```
long foo(int num)
{
    int i;
    long f=1;
    for(i=1; i<=num; i++)
        f = f * i;
    return(f);
}
```

(a) The function calculates the value of 1 raised to power num.

(b) The function calculates the square root of an integer

(c) The function calculates the factorial value of an integer

(d) None of above

12. (2 points) In the provided space write C code that will assign integral part of `z` to variable `whole` and the fractional part of `z` to variable `frac`.

```
#include<stdio.h>
int main(void){
  double z;
  int whole;
  double frac;
  printf("Enter a non-negative number:\n");
  scanf("%lf", &z);

/* your code goes here */









  return(0);
}
```

13. Which of the following statements is correct about the following program?

```
#include<stdio.h>
#define MAX1 100
```

```
#define MAX2 200

int main(void){
  int i, j;
  i = 1;
  i=j;
  if(i<=j){
    MAX1=MAX2;
    printf("\n MAX 1 and MAX 2 are now equal, MAX=%d, MAX2=%d", MAX1, MAX2);
  }
  return(0);
}
```

(a) `printf` function is called 0 times.

(b) `printf` function is called 1 time.

(c) It is unpredictable what the program will print.

(d) The program does not compile.

(e) None of above

14. What is printed by the following program if the user entered the following:
2.5 4.0 u

```
#include<stdio.h>
int main(void){
  double x, y, z;
  int i;
  printf("Enter three integers\n");
  i=scanf("%lf %lf %lf", &x,&y,&z);
  printf("%d",i);
  return(0);
}
```

(a) -1 (b) 0 (c) 1 (d) 2 (e) 3

(f) unpredictable

15. What is printed by the following program?

```
#include<stdio.h>
int foo(int x);
int main(void){
  int y=15;
  printf("%d\n", foo(y));
  return(0);
}

int foo(int x)
{
  return(x<0);
}
```

(a) TRUE

(b) FALSE

(c) 0

(d) 1

(e) None of the above

16. Think of the memory allocation that happens as a program runs. In the space provided after this program, draw the Data Area of its `main` function right before `printf` is executed. Make sure to display known values that are stored in the allocated memory cells.

```
#include<stdio.h>
int main(void){
  char ch;
  int a, b;

  a=5;
  b=a+5;
  printf("b=%d", b);
  ch='*';
  return(0);
}
```

---

17. In the space provided after this program, draw the Data Area(s) of the functions active in the program right before `z=x*y;` is executed. Make sure to display known values that are stored in the allocated memory cells.

```
#include<stdio.h>
int times(int x, int y);
int main(void){
  int a=4, b=2, c;
  c=times(a,b);
```

```
  printf("Here is your result\n");
  printf("c=%d\n", c);
  return(0);
}

int times(int x, int y)
{
  int z;
  z=x*y;
  return(z);
}
```

---

18. In the space provided after this program, draw the Data Area(s) of the functions active in the program right after it prints `Here is your 1st result`. Make sure to display known values that are stored in the allocated memory cells.

```
#include<stdio.h>
int times(int x, int y);
int main(void){
  int a=4, b=2, c;
  c=times(a,b);
  printf("Here is your 1st result\n");
  printf("c=%d\n", c);
  a=10;
  b=5;
  c=times(a,b);
  printf("Here is your 2nd result\n");
  printf("c=%d\n", c);
  return(0);
}

int times(int x, int y)
```

```
{
  int z;
  z=x*y;
  return(z);
}
```

---

19. Why does the following program not compile? Write your answer in the rectangle below.

```
#include<stdio.h>
void initialize(int a);
int main(void){
  int x=5;
  initialize(x);
  printf("x=%d, a=%d",x,a);
  return(0);
}

void initialize(int a)
{
  a=0;
}
```

20. What is the output of the following program?

```
#include<stdio.h>
int main(void){
    int x=30, *y, *z;
    y=&x;
```

```
    z=y;
    *z=5;
    x++;
    printf("x=%d, *y=%d, *z=%d\n", x, *y, *z);
    return(0);
}
```

(a) x=31, *y=30, *z=5

(b) x=6, *y=30, *z=5

(c) x=5, *y=31, *z=5

(d) x=6, *y=6, *z=6

(e) x=6, *y=30, *z=5

21. What is the output of the following program?

```
#include<stdio.h>
int main(void){
  char x, y, *a, *b;
  x='A';
  a=&x;
  y='a';
  b=&y;
  *a=*b;
  printf("x=%c, y=%c, *a=%c, *b=%c", x,y, *a, *b);
  return(0);
}
```

(a) x=a, y=a, *a=a, *b=a

(b) x=A, y=A, *a=A, *b=A

(c) x=A, y=a, *a=a, *b=a

(d) x=A, y=a, *a=A, *b=a

(e) x=A, y=A, *a=a, *b=a

22. (2 points) In the box on the next page, write a program that prompts a user to enter a character and prints "I am a letter" if a character is a letter, otherwise it prints "Not a letter". You program should have (and use) a function called `am_letter` that takes as an input a letter and returns "1" if the input character is a letter and returns 0 if it is not a letter.