Name _____ DigiPen login: _____

CS120 Practice Final

Introduction

I do not have the final or know what's on it so this is an approximation of questions which I feel may be expected to be on the CS120 Final. This may be helpful for studying but in no way is it a replacement for studying all of the content in the class. Remember; if you need any help please feel free to see me or any of the other TAs. We're here to help. Also feel free to e-mail me at jodoran@digipen.edu.

Good luck!
-John

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1. What output is produced by the following call to printf? Be sure to pay attention to the vertical bars.
   a) `printf("|%-9g|", 3.1415926);`
   b) `printf("|%.4f|", 83.162);`

2. What output is produced by the following `printf` statements? Assume that `i`, `j`, and `k` are integers.

```
   i = 4; j = 11;
a) printf("%d", i++ - ++j); _____

b) printf("%d, %d", i, j); _____

   i = 7; j = 3;
c) printf("%d", i++ + --j); _____

d) printf("%d, %d", i, j); _____

   i = 6; j = 1; k = 9;
e) printf("%d", i++ - j++ + --k); _____

f) printf("%d, %d, %d", i, j, k); _____
```

3. What is the output from the `printf` statement below?

```
int a = 1; int b = 2; int c = 3;

int d = 4; int e = 5; int f = 6;

a = b *= c++ -d + --e / - -f;

printf("%d, %d, %d, %d, %d, %d", a, b, c, d, e, f);
```

_____

4. What is the type of each constant value below?

a) 100 _____

b) 10.0 _____

c) 34U _____

d) -13L _____

e) 100LU _____

f) 24.2F _____

g) 42.0L _____

h) 'A' _____

5. Given the following program, will it compile? If yes specify is the output, else point out the error.

```
#include <stdio.h>
void main(void)
{
   char a = '4';
   char b = '5';
   char * const p = &a;
   p = &b;
   printf("%c\n",*p);
}
```

6. Given the declarations below, determine the **sizeof** each expression. All expressions are legal.

```
short int a[5];
long int b[10];
int c[] = {0, 0, 0};
short int *d;
int *e;
```

   a) `sizeof(a)` _____

   b) `sizeof(b)` _____

   c) `sizeof(c)` _____

   d) `sizeof(d)` _____

   e) `sizeof(e)` _____

   f) `sizeof(a[3])` _____

   g) `sizeof(*c)` _____

7. Given the declarations below, what is printed? All expressions are legal.

```
int a[] = {5, 1, 8, 5, 15, 13, 2, 7};
int *p = &a[2];
int *q = &a[5];
```

   a) `printf("%i", *(p + 3));` _____

   b) `printf("%i", *(q - 3));` _____

   c) `printf("%i", q - p);` _____

   d) `printf("%i", *q - *p);` _____

8. Given the declarations below, what is printed? All expressions are legal.

```
int a[] = {1, 4, 0, 8, 6, 7, 2, 9};
int *p1 = &a[3];
int *p2 = &a[5];


printf("%i", p1 - p2); _____
```

9. Given the code below, what will be printed in the `foo` function?

```
void swap(int a, int b)
{
   int temp = a;
   a = b;
   b = temp;
}
```

```
void foo(void)
{
   int a = 5, b = 7, c = 9;

   swap(a, b);
   swap(b, c);
   swap(a, c);
   printf("%i, %i, %i\n", a, b, c);
}
```

_____

10. Mark T for true and F for false:
    a) _____ You can only declare variables in the last case of a switch statement
    b) _____ For if, the parentheses are required, but for switch, they are optional
    c) _____ Switch statements only operate on floating point values
    d) _____ Case labels can only include compile-time constant values
    e) _____ The do-while loop is the same as a while loop except it is guaranteed to run at least once.
    f) _____ All three expressions of the for-loop are required.
    g) _____ A while-loop continues to execute as long as the condition is true.
    h) _____ A for-loop continues to execute until the condition becomes true.
    i) _____ There will be a compiler error if you make an infinite loop.

11. Suppose we have the following declaration: static int grid[100][100]. Express grid[0][0] in three different ways.

12. Given the following program, what will be its output?

```
#include<stdio.h>

void test(int buff[][2])
{
   printf("%d\n", (buff + 1)[0][1]);
}

void main(void)
{
   int array[3][2] =
   {
         {1, 2},
         {3, 4},
         {5, 6}
   };
   test(array);
}
```

_____

13. Given these variables, mark T if the expression evaluates to true, or F for false:

```
int a = 2, b = 0, c = 7, d = 3, e = 5;
```

a. _____ a > b == b < c
b. _____ b < d < a
c. _____ b < b <= b
d. _____ 'a' > 'b'
e. _____ c = e
f. _____ !a == b
g. _____ e || b
h. _____ e && b
i. _____ !b && !b
j. _____ a = b
k. _____ !(a || b)
l. _____ b < d && d < e
m. _____ 'b' < 'd' && 'd' < 'e'
n. _____ !(a < c) && b || c
o. _____ a || (b && d) < e

14. Given these variables, evaluate their values after the following expression have been evaluated:

```
int a = 1, b = 2, c = 3, d = 4, e = -1;
```

15. `e = a-- + ++b * - c + d++`

    a:_____ b :_____ c:_____ d:_____ e:_____

16. `a = (e + 4), ((b++ + 23), --c + 3), d + b += a`

    a:_____ b :_____ c:_____ d:_____ e:_____

17. `e = ( --a + d++, sizeof(++a) * b + c), c + b++, d + ++a--`

    a:_____ b :_____ c:_____ d:_____ e:_____

Write code to answer the following questions:

18. Declare a struct called Student that has a string name and an integer ID number. (5 points)

19. Declare a function called Enroll that takes a Student reference and returns a Student reference. (5 points)

20. Mark T for true and F for false:

a) _____ Defining a new struct defines a new type.
b) _____ Structs can't contain data of other struct types.
c) _____ Structs must always have an identifier.
d) _____ If you end a struct definition with a semi-colon, you get a compiler error.
e) _____ Struct member names are unique to that struct, and won't conflict with other scopes.
f) _____ Structure data is always initialized to zero.
g) _____ You can use the dot (.) operator to access struct instance members.
h) _____ Structs, like arrays, cannot be assigned to one another.
i) _____ Structs can be initialized like arrays using comma-separated values in curly-braces.
j) _____ There arrow (->) operator is equivalent to dereferencing and using the dot operator.
k) _____ You cannot return structs from functions, only struct pointers.
l) _____ Structs can't contain data members of their own type.

Write code to answer the following questions:

21. Declare and dynamically allocate a Student object. (2 points)

22. Delete the object you created in the previous question. (2 points)

23. Mark if the follow statements as being legal (L) or not legal (NL).

```
int a = 10;
float b = 3.14f;
int* pi;
float* pf;
   a) _____  pi = a;
   b) _____  pi = &a;
   c) _____  pi = 20;
   d) _____  *a = pi;
   e) _____  pf= pi;
   f) _____  *pf= 3;
   g) _____  *pf= *pi;
   h) _____  pf= &b;
   i) _____  pi = *pf;
```

24. *Mark T for true and F for false:*

a) _____ Programs automatically deal with dynamically allocated memory for you.
b) _____ You must not delete memory more than once after it has been allocated.
c) _____ Deleting a NULL pointer is ok, and does nothing.
d) _____ All functions require a return type in the declaration, even if it's void.
e) _____ When calling a function, if there are no parameters, parentheses are optional.
f) _____ If a function is not prototyped or defined before use, there will be a compiler error.
g) _____ Function definitions always end with a semicolon.

25. What is the type and value of the following expressions?

```
int a[] = {5, 8, 3, 2, 1, 9, 0, 4, 7, 6};
int* p = a + 2;
```

a) `p` Type: _____ Value:_____

b) `p[0]` Type: _____ Value:_____

c) `*p` Type: _____ Value:_____

d) `p + 3` Type: _____ Value:_____

e) `*p + 4` Type: _____ Value:_____

f) `*(p + 6)` Type: _____ Value:_____

g) `p[6]` Type: _____ Value:_____

h) `&p` Type: _____ Value:_____

i) `p[-1]` Type: _____ Value:_____

j) `p[9]` Type: _____ Value:_____

For the following, prototype a function described by the English sentence:

a) A function called “func1” that takes two floats and returns an int.

b) A function called “foo” that takes an array of ints and the size of the array, and returns nothing.

c) A function called “bar” that takes nothing and returns a pointer to a const int.

d) A function called “noof” that takes a pointer to a const int, a pointer to an int, an int and returns an int.

26. Declare an array of 3 ints and initialize it with today's date: day, month and year.

27. A. Declare an array of floats and initialize with 1.2, 3.4, 5.6 and 7.89.

B. How many bytes is this array?

28. A. Declare an array of 5 pointers to doubles.

B. How many bytes in this array?

29. Write a function that takes an array and its size and prints out each value in the array. Do not use the subscript operator.

30. Write a function that takes in two numbers that will create a text file called “numbers.txt” and write all of the even numbers between them.