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CPSC 1020 Spring 2019

EXAM #1

THIS IS A CLOSED BOOK EXAM. PLEASE KEEP YOUR NOTES AND YOUR COMPUTERS CLOSED. YOU HAVE 50 MINUTES TO COMPLETE THE EXAM. THERE IS A TOTAL OF 32 POINTS. ALTHOUGH THE POINTS TOTAL 32, YOUR GRADE WILL REFLECT 100%. EX. A TOTAL SCORE OF 32 WILL RESULT IN 100%, A TOTAL SCORE OF 28 WILL RESULT IN AN 87.5%. ADDITIONALLY THERE IS ONE BONUS QUESTION WORTH 3 POINTS. (ON A 100 POINT SCALE THE BONUS POINT IS ALMOST A LETTER GRADE). ON MANY OF THE QUESTIONS PARTIAL CREDIT MAY BE CONSIDERED.

Question 1: (2 point): [POINTERS and TRACING CODE]

What is the output of the following program? Show your work or your thought process.

```
#include <stdio.h>

int f(int , int *, int **);

int  main()
{
   int c, *b, **a;
   c = 6;
   b = &c;
   a = &b;

   printf("%d \n", f(c, b, a));

   return 0;
}

int f(int x, int *py, int **ppz)
{

   int y, z;
   **ppz += 2;
   z  = **ppz;
   *py += 3;
   y = *py;
   x += 5;

   return x + y + z;
}
```

Output:

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Question 2: (2 point): [POINTERS]

In class we discussed several reasons why you would want to use pointer. Name one from the list we discussed.

Question 3: (3 points) [POINTERS, PASS BY VALUE/REFERENCE]

Consider the following code:

```
#include <stdio.h>
/*This function is used to change the value of a variable represented by
 *val, to the value of num*/
void changeValue(int* val, int num);

int main()
{
        int var = 100;
        int* varPtr = &var;
```

Part 1: /*Write the code to call the function changeValue to change the value of var to 500. */

```
         /*Both of these lines of code should print 500*/
          printf("%d\n%d\n", var, *varPtr);

        return 0;
}
```

Part 2: /*Implement the function changeValue discribed above.*/

```
void changeValue(int* val, int num)
{




}
```


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Question 4: (1 points) [Linked List]

Based on the linked list we discussed in class, explain how to determine if a list is empty.

Question 5: (1 points) [CONSTANT VARIABLES VS #DEFINE]

In class we discussed one major difference between C++ constant variables and C-style #define. Briefly describe this major difference. Use no more than 2 sentences.

Question 6: (2 Points)[C++ VARIABLES]

Indicate which of the following variable declarations are valid. If the declaration is valid what is the declared data type?

Valid/Invalid	variable declaration	type
_____	auto var1 = 100;	_____
_____	auto var2 = 456LL;	_____
_____	auto var3;	_____

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Name _____(PRINT) CID_____

Question 7: (7 points)[MULTIPLE C++ CONCEPTS]
To save time, the lines bolded you can skip re-writing since they do not need to change.
Rewrite the following program in C++

```
#include<stdio.h>
#define NUM 10
int main(int argc, char* argv[])
{

  FILE* input = fopen(argv[1], "r");
  FILE* output = fopen("output.txt", "w");

  int array[NUM];
  int sum = 0, i;
  for(i = 0; i < NUM; i++)
  {
    fscanf(input, "%d", &array[i]);
    sum += array[i];
  }
  float average = ((float)sum)/NUM;
  printf("average = %.2f\n", average);

  fclose(input);
  fclose(output);

  return 0;

}
```


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Name _____(PRINT) CID_____

Question 8: (2 points) [GENERAL C/C++ DATA READING ISSUES]
Consider the program below:

```
#include <iostream>
using namespace std;

int main(){
  char ch;
  cout << "Type a character and press Enter: ";
  cin  >> ch;


  cout << "You entered " << ch << endl;

  cout << "This program has paused. Press Enter to continue.";
  cin.get(ch);
  cout << "It has paused a second time. Please press Enter again.";
  ch = cin.get();
  cout << "It has paused a third time.  Please press Enter again.";
  cin.get();
  cout << "Thank you!\n";
  return 0;
}
```

Explain the problem with this program. 2 points

Add the code to the program to fix this problem. Your solution must use the method we discussed in class. One line of code is all that is required here. 2 Points

When I compile and run this program I expect the program to do the following:

Type a character and press Enter: **(I enter Y and return)**
You entered Y
This program has paused. Press Enter to continue. **(I enter return)**
It has paused a second time. Please press Enter again. **(I enter return)**
It has paused a third time. Please press Enter again**.(I enter return)**
Thank you!

However, this program actually ran as follows:

Type a character and press Enter: **(I enter Y and return)**
You entered Y
This program has paused. Press Enter to continue. It has paused a second time. Please press Enter again. **(I enter return)**
It has paused a third time. Please press Enter again. **(I enter return)**
Thank you!

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Question 9: (2 points) [SCOPE AND NAMESPACE]
Consider the following namespace declarations. Below complete the two instructions above main.

```
#include <iostream>
using namespace std;
namespace foo
{
  int fun() { return 5; }
}
namespace bar
{
  const double PI = 3.1416;
  double fun() { return 2*PI; }
}
```

1.In main write the code necessary to print the return value of the function fun() that belongs to foo.
2.In main write the code necessary to print the value of PI.

```
int main ()
{




  return 0;
}
```


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Question 10: (3 points) [FUNCTION POINTERS]

```
#include <stdio.h>
#include <stdlib.h>

float Plus    (float a, float b) { return a+b; }
float Minus   (float a, float b) { return a-b; }
float Multiply(float a, float b) { return a*b; }
float Divide  (float a, float b) { return a/b; }


void Function_Pointer(float a,float b, float(*pt2Func)(float,float))
{
   // call using function pointer
  float result = pt2Func(a, b);

  printf("%.2lf\n", result);
}

int main()
{
          float a = 2;
          float b = 5;
```

/*1. Create a function pointer called fp and point it to any one of the four function prototypes listed above*/

/*2. Now complete the code to call the function pointer you created in 1. */

```
        float result = _________________
```

/*3. Based on the function defined and implemented above fill in the parameters needed to call this function*/

```
        Function_Pointer( ________, _________, _________ );

         return 0;
```


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}

Question 11: (3 points) [Dynamically Allocation for a 2D array]

Write the code to dynamically allocated the memory for a **two dimensional array** of size **HEIGHT** and **WIDTH**

Question 12: (2 points) [Range Based For Loop]

Consider the following array.

int arr[5] = {5,10,15,20, 25};

Use a for each statement (range based for loop) to print in C++ the value of each element in the array.
The format of the output should be: 5, 10, 15, 20, 25

Name _____(PRINT) CID_____

Question 13: (2 points) [Manipulators]

Given the following program, what is the output.

```
#include <iostream> #include <iomanip> using namespace std;
int main () {
double f =3.14159;
cout << setprecision(5) << f << endl;
cout << setprecision(9) << f << endl;
cout << fixed;
cout << setprecision(5) << f << endl;
cout << setprecision(9) << f << endl;
return 0;
}
```

OutPut:

Bonus Question: (3 Points) [Memory Allocation]

Write the code to free the allocated memory from Question above.

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