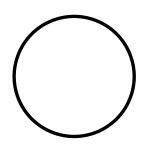
CSE130 - Dr. Roman V. Yampolskiy Introduction to Programming Languages Examination 2



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- 1. Books, Notes, Calculators, AI, etc. are not allowed.
- 2. You may not interact with anyone except the instructor during the examination.
- 3. You may not share any materials, offices supplies, etc. with anyone.

Problem 1 (6 points):

For each of the following, write T if the statement is true and F if it is false. You must use T or F. Do not use x's or check marks they will be counted as wrong answers.

1	OOP stands for Object Only Property.	F
2	Polymorphism means that each object can be used in more than one program.	F
3	Encapsulation means that memory is dynamically allocated.	F
4	The purpose of a constructor is to allocate memory to class instances.	T
5	To make a function an inline function place the reserved word inline before the function	T
	name, and define the function before any calls are made to it.	
6	Inheritance makes it possible to use code written in a different language.	F

Problem 2: (12 points)

1. Suppose we've defined a book class to include a setTitle method with a prototype:

void setTitle(char *);

Suppose further we have an instance of the book class named bookOne. Determine which of the following statements correctly invokes the setTitle method: $\underline{\mathbf{C}}$

```
a. title = BookOne.setTitle("Book One");
```

b. title = book.setTitle("Book One");

c. bookOne.setTitle("Book One");

- d. book.setTitle("Book One");
- 2. Let v be a static variable defined in a function called f
- a. v gets initialized every time f is called
- b. v can only be accessed once in the program

c. v retains its value between calls of f

- d. v stays constants for all calls of f
- 3. Given the C++ declaration: class A {public: int x; protected: int y;}; Which of the following would be rejected by the compiler?

```
a. class B: public A { void f() { x = y; }};
```

b. class B { void f() { A a; a.x = a.y; }};

- c. class B: public A $\{\}$; class C: public B $\{$ void f() $\{$ x = y; $\}\}$;
- d. None of the above

4. The output of the C++ code,

```
#include <iostream>
using namespace std;
class A { public: int f(int x) { cout << x << " "; }};
class B: public A { public: int f(int y) { A::f(y+1); }};
void g(A a, B b) { a.f(3); b.f(3); }
int main() { B p; B q; g(p,q); }</pre>
```

would be

- a. 33
- b. 34
- c. 44
- d. **None of the above** won't compile. No return on non-void functions.
- 5. Given the C++ declaration: template<class T> class set { ...} which of the following declarations (outside of the template) could not be correct?
- a. set s;
- b. set<int> s;
- c. set<float> s;
- d. set \leq set \leq int \geq \leq \leq
- 6. Which one of the following statements is NOT true about multiple inheritance in C++?
- a. It allows a class to be considered a subclass of two other classes.
- b. It allows objects of the child class to have all the members of two parent classes.
- c. If a class is derived from two parent classes and both have a method with the same signature, the compiler will generate an error message.
- d. A class can be derived from more than two classes.

Problem 3 (3 points)

Turn the C++ definition: int sum(int a, int b, int c) { return a+b+c; } into a function template that can be used to work on any type that supports +, instead of just int.

template <class T>

```
T sum( T a, T b, T c) { return a + b + c }
```

Problem 4 (10 points)

Correct the syntax errors in each code segment below. If the code segment contains no error in the code segment, clearly write *no error* next to the code segment. *Correct syntax errors only (that means only the errors that will prevent the code from compiling)*. Assume that all variables used have been declared.

```
cout << "Hello Worlds!";</pre>
                                  no error
cin >> x;
cout << "The sum of x and y is" << x + y << "integer units";</pre>
int x = 10;
int y = 20;
x = y/10;
int x = 0;
int y = 10;
int z = x/y; //It would probably compile but zero division won't work. 'y'
as denominator would allow the program to actually run.
int x = 0;
cin >> y;
if (x == y) cout << "They are equal!!" << endl;
   cout << "Doesn't matter which comes first!" << endl;</pre>
   cout << "They are not equal!!!";</pre>
}
if (x == y)
   cout << "X and Y are equal!" << endl;</pre>
else cout << "They are not equal." << endl;
x = 0;
while (x < 10){
  X++;
  cout << "The value of x is: " << x;
x = (y == 2);
                             no error
(x + y) = z; ?? what do you even want here? Z = (x+y) will compile
```

```
Give an example of an abstract class declaration:
class Shape {
public:
       Shape( double x, y);
       virtual getArea();
       virtual printArea() = 0;
private:
       double _x, _y;
};
Problem 6 (6 points)
Please provide definitions for the overloaded swap() function, which swaps 2 values:
//can also just be overloaded with a template
template <class T>
void swap(T *a, T *b){
       T temp = *a;
       *a = *b;
       *b = temp;
}
void swap (int *a, int *b) {
       int temp = *a;
       *a = *b;
       *b = temp;
};
void swap (float *c, float *d) {
       float temp = *c;
       *c = *d;
       *d = temp;
};
void swap (char *p, char *q) {
       char temp = *p;
       *p = *q;
       *q = temp;
};
```

Problem 5 (3 points)

Problem 7: (10 points) Create a class named Point that represents points in a three dimensional space that has the following properties:

- 1. It contains three double variables x, y, z representing the components as instance variables.
- 2. It includes a default constructor that initialize x, y, and z to 0.
- 3. It includes a constructor that requires three arguments one for each component.
- 4. It includes a method to translate the point by dx, dy, and dz in the x, y, and z direction. That is new x component should become x + dx, etc.