

Sample Exam Week 07

CSE 232 (Introduction to Programming II)

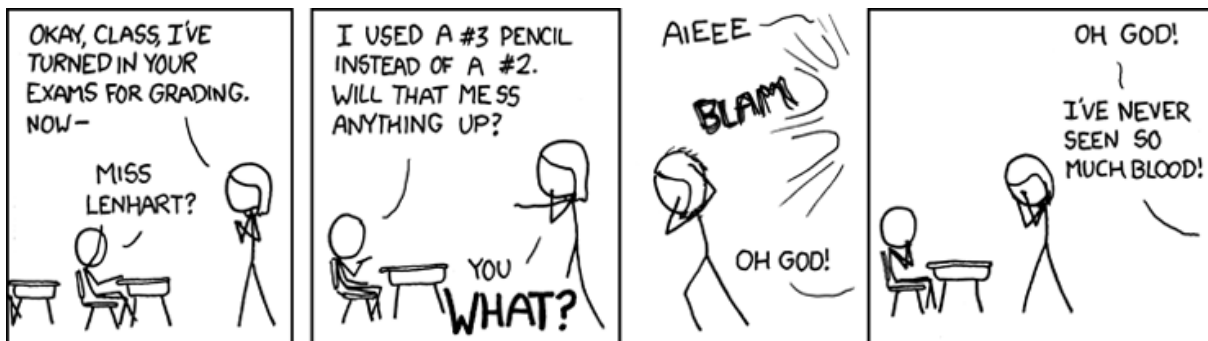
VERSION A

Full Name:

Student Number:

Instructions:

- DO NOT START/OPEN THE EXAM UNTIL TOLD TO DO SO.
- You may however write and bubble in your name, student number and exam **VERSION/FORM NUMBER** (with a #2 pencil) on the front of the printed exam and bubble sheet prior to the exam start. This exam is Version A. Your section doesn't matter and can be ignored.
- Present your MSU ID (or other photo ID) when returning your bubble sheet and printed exam.
- Only choose one option for each question. Please mark the chosen option in both this printed exam and the bubble sheet.
- Assume any needed `#includes` and `using std::...;` namespace declarations are performed for the code samples.
- Every question is worth the same amount of points. There are 55 questions, but you only need 50 questions correct for a perfect score.
- No electronics are allowed to be used or worn during the exam. This means smart-watches, phones and headphones need to be placed away in your bag.
- The exam is open note, meaning that any paper material (notes, slides, prior exams, assignments, books, etc.) are all allowed. Please place all such material on your desk prior to the start of the exam, (so you won't need to rummage in your bag during the exam).
- If you have any questions during the exam or finish the exam early, please raise your hand and a proctor will attend you.



<http://xkcd.com/499/>

1. A const member function has what property that distinguishes it from a non-const member function?
 - (a) It returns a const object.
 - (b) It is a getter member function.
 - (c) It can be called on const objects.
 - (d) It returns a reference to a const object.
 - (e) It has only const parameters.
 - (f) All of the above.
2. Which of the following exceptions will be raised if allocated memory is not deleted?
 - (a) `std::runtime_error`
 - (b) `std::logic_error`
 - (c) `std::bad_alloc`
 - (d) `std::system_error`
 - (e) None of the above.
3. Which of the following member functions should usually be marked `const`?
 - (a) Getters
 - (b) Setters
 - (c) Copy Constructors
 - (d) Destructors
 - (e) All of the above.
 - (f) None of the above.
4. For a class named `Thing`, what is the type of the implicit `this`?
 - (a) `Thing * const`
 - (b) `Thing`
 - (c) `const Thing * const`
 - (d) `Thing *`
 - (e) Depends on if the member function is `const`.
5. Which of the following is true about memory leaks?
 - (a) They are caused by using up too much memory on the stack.
 - (b) They alter the output from a program.
 - (c) They are avoided by using dynamic memory allocation.
 - (d) They result in a program using more memory than needed.
 - (e) All of the above.
6. Which of the following classes should have a custom destructor?
 - (a) A class that utilizes private data members.
 - (b) A class with a custom default constructor.
 - (c) A class that has an STL container as a data member.
 - (d) A class that stores its data on the heap.
7. Why do `operator+=`, `operator<<` and `operator=` return a reference and take a reference as their first parameter instead of regular objects?
 - (a) So that they can be used as operators.
 - (b) Because they can only work on references, not values.
 - (c) To ensure that they don't raise exceptions.
 - (d) To ensure that they don't change their arguments.
 - (e) So that they can be chained.

8. Which of the following is **FALSE** about the `operator+` function member?
- It should have a `const` return type in indicate that its result should not be changed.
 - It should return a reference instead of an object to avoid a needless copy.
 - It should have `const` after the parameter list to indicate that it doesn't change its object.
 - It should take `const` parameters because it doesn't need to change them.
 - All of the above are true.
9. If the following line is valid code, which of the following must be true?
`int x = this->func();`
- There is a class with a member function named `func`.
 - `func`'s return type is `int`.
 - The above line must be in a member function.
 - (a) and (b)
 - (b) and (c)
 - (a) and (c)
 - (a), (b), and (c)
 - None of the above
10. Why do we recommend wrapping calls to a STL container's size method in a static cast? Example:
`static_cast<int>(vec.size())`
- Because STL algorithms only work with iterators.
 - Because working with unsigned ints is hazard prone.
 - Because `size` returns an `int`.
 - Because the compiler will not allow ints and unsigned ints in the same math operation.
 - Because the `static_cast` checks that the value is a non-negative value.
11. `g++` supports various optimization flags that sometimes result in faster run times for program compiled with that flag (e.g. `-O1`, `-O2`, and `-O3`). What is the downside to using such flags?
- They often increase compilation time.
 - They only work on programs that don't use `iostreams`.
 - They alter the results of your program.
 - They use more processors on the computer.
 - None of the above.
12. Setter member functions can be distinguished from getter member functions by which of the following properties?
- Setter functions may be void member functions
 - Setter functions have parameters
 - Setter functions are not `const` member functions
 - All of the above
13. In the expression `(5 + 6)` the value 11 is returned. What is returned by the expression `(std::cin >> x)`?
- A `bool` value (`true` or `false`) indicating if the extraction operation was successful
 - A function pointer to `operator>>` so that the operation can be captured
 - `std::cin`, to enable additional inputs
 - None of the above

14. The fact that the following code prints 7 tells you what about `std::vector`'s `operator[]` method?
- ```
vector<int> v {0, 1, 2};
v[0] = 7;
cout << v[0];
```
- That the version of `operator[]` that was called returns a reference
  - That the `operator[]` has a non-const member function implementation
  - That the `operator[]` has an implementation that can accept an `int` as an argument
  - (a) and (b)
  - (a) and (c)
  - (b) and (c)
  - (a), (b), and (c)
  - None of the above
15. Which of the following invoke the default constructor for the class named `Thing`?
- `Thing t = x;`
  - `Thing t{x};`
  - `Thing t(x);`
  - `Thing t(&x);`
  - All of the above
  - None of the above
16. Const member functions have what capability that non-const member functions don't have?
- They can be called on const objects
  - They can take const arguments
  - They allow getters to access private attributes
  - They don't make copies of their arguments
  - They guarantee to the compiler that they won't change any of their arguments
17. Why should you delete dynamically allocated memory?
- Because the copy constructor requires it
  - To avoid memory usage increasing unbounded
  - To ensure that variables aren't shadowed
  - To allow arrays to grow in size
  - None of the above
18. What is the difference between using (`this->jump()`) versus just (`jump()`) inside a member function?
- Using `this` ensures that the `jump` method doesn't change the object
  - Using `this` will work even if `jump` is private, whereas the latter will not
  - Using `this` is faster as the program doesn't need to determine how many times `jump` will be called
  - Using `this` is preferred as the latter option isn't part of the C++ Standard
  - There is no functional difference
19. Which of the following causes memory leaks?
- Copying pointers and references.
  - Not `delete`'ing `new`'ed memory.
  - Allowing variables to fall out of scope.
  - Accessing uninitialized memory.
  - None of the above.
20. What does marking a function member `const` indicate?
- That it can be invoked on const objects.
  - That it doesn't change the object it belongs to.
  - That it returns a const object.
  - All of the above.
  - Only (a) and (b).
  - Only (a) and (c).
  - Only (b) and (c).
  - None of the above.

21. When is an object's destructor called?

- (a) When the block of that local variable ends.
- (b) When the delete operator is called on that object.
- (c) When that object is assigned to.
- (d) (a) and (b)
- (e) (a) and (c)
- (f) (b) and (c)
- (g) All of the above.
- (h) None of the above.

22. Assuming 32-bit ints, how many bytes of memory does the following code leak?

```
for (int i = 0; i <= 3; ++i) {
 if (i) int * ptr = new int[i];
}
```

- (a) 72
- (b) 48
- (c) 24
- (d) 12
- (e) 9
- (f) 6
- (g) 3
- (h) 0

23. What does the `-Werror` flag do in `g++`?

- (a) It turns on all error checking during compilation
- (b) It turns on error checking for the use of `while` loops
- (c) It transforms all warnings into errors to make them halt compilation
- (d) It turns on warnings in case you have any errors in your code

24. The language feature of using the same operator many times in a single statement, for example:

```
apple = banana = carrot;
or
cin >> apple >> banana >> carrot;
Is called what?
```

- (a) Repetition
- (b) Linkage
- (c) Assignment
- (d) Implicit Execution
- (e) Fall-through
- (f) Iteration
- (g) Chaining

25. The principle of RAII dictates that which of the following actions should be taken?

- (a) Resources should be acquired in an object's constructor.
- (b) Resources should be accessed in an object's getters.
- (c) Resources should be altered in an object's setters.
- (d) Resources should be released in an object's destructor.
- (e) (a) and (d) are correct.
- (f) (b) and (c) are correct.
- (g) All are correct.
- (h) None are correct.

