

## CSCE 240 - Programming Assignment Five

**Due:** 11:59pm on Wednesday, April 12

### Purpose - Derive three classes from the provided Question class

Create a *TrueFalseQuestion* class as a child of the *Question* class. The class will contain one private bool data member for whether the answer to the question is true or false. You will include a constructor with default arguments for the question and answer, accessor and mutator functions for the private data member, and a destructor and Print function. Read the comments in the supplied *truefalsequestion.h* header file for more detailed requirements. Initial tests for the functionality of the *TrueFalseQuestion* class have been provided in the attached *testtf.cc* source file. You are encouraged to create more rigorous tests.

Create a *ShortAnswerQuestion* class as a child of the *Question* class. The class will contain one private string data member for the correct answer to the question. You will include a constructor with default arguments for the question and answer, accessor and mutator functions for the private data member, and a destructor and Print function. Read the comments in the supplied *shortanswerquestion.h* header file for more detailed requirements. Initial tests for the functionality of the *ShortAnswerQuestion* class have been provided in the attached *testsa.cc* source file. You are encouraged to create more rigorous tests.

Create a *MultipleChoiceQuestion* class as a child of the *Question* class. The class will contain three private data member: an int for the number of answer choices, a pointer to a string to hold the dynamically allocated array of answer choices, and a pointer to a bool to hold the dynamically allocated array of true/false values denoting whether or not each of the corresponding answer choices is correct. You will include a constructor with default arguments for the data members, a copy constructor, accessor and mutator functions described in the header file, and a destructor and Print function. Read the comments in the supplied *multiplechoicequestion.h* header file for more detailed requirements. Initial tests for the functionality of the *MultipleChoiceQuestion* class have been provided in the attached *testmc1.cc* and *testmc2.cc* source files. You are encouraged to create more rigorous tests.

### Specifications

- Do not modify any of the code in *question.h*
- Add all code for the definition of the *TrueFalseQuestion* class to the attached *truefalsequestion.h* header file.
- Include all of the necessary code for the *TrueFalseQuestion* class, including the implementation all of the public member functions, in the attached *truefalsequestion.cc* source file.
- Add all code for the definition of the *ShortAnswerQuestion* class to the attached *shortanswerquestion.h* header file.

- Include all of the necessary code for the *ShortAnswerQuestion* class, including the implementation all of the public member functions, in the attached *shortanswerquestion.cc* source file.
- Add all code for the definition of the *MultipleChoiceQuestion* class to the attached *multiplechoicequestion.h* header file.
- Include all of the necessary code for the *MultipleChoiceQuestion* class, including the implementation all of the public member functions, in the attached *multiplechoicequestion.cc* source file.
- You are required to use pointers as data members in the *MultipleChoiceQuestion* class and to manage the dynamic allocation and deallocation of memory for these data members.
- You will submit a zip file (only a zip file will be accepted) containing *truefalsequestion.h*, *truefalsequestion.cc*, *shortanswerquestion.h*, *shortanswerquestion.cc*, *multiplechoicequestion.h* and *multiplechoicequestion.cc* to the assignment in Blackboard.
- Source files must compile and run on a computer of the instructor's choosing in the Linux lab (see your course syllabus for additional details).

## **Testing**

- A makefile has been included to aid in using *testtf.cc*, *testsa.cc*, *testmc1.cc*, *testmc2.cc*, and *checkit.cc* to test the basic functionality of your classes. To use the makefile, your program 5 directory should include:  
your files: *truefalsequestion.h*, *truefalsequestion.cc*, *shortanswerquestion.h*, *shortanswerquestion.cc*, *multiplechoicequestion.h*, *multiplechoicequestion.cc*  
the *makefile* and *question.h*  
the test files: *testtf.cc*, *testsa.cc*, *testmc1.cc*, *testmc2.cc*, and *checkit.cc*  
the subdirectory "output" that contains *correcttf.txt*, *correctsa.txt*, *correctmc1.txt*, *correctmc2.txt*
- To Test your TrueFalseQuestion class, type: *make testtf*
- To test your ShortAnswerQuestion class, type: *make testsa*
- To test your MultipleChoiceQuestion constructor with default arguments and Print function, type: *make testmc1*
- To Test your MultipleChoiceQuestion copy constructor and SetAnswerChoices function, type: *make testmc2*
- Note: each of the tests above runs the executable generated by the included *checkit.cc* source file which compares the output created by your functions to the expected output (held in the files provided in the output folder).

## **Grade Breakdown**

Style *truefalsequestion.h*: 0.1 point  
Style *truefalsequestion.cc*: 0.2 point  
Style *shortanswerquestion.h*: 0.1 point  
Style *shortanswerquestion.cc*: 0.2 point

Style *multiplechoicequestion.h*: 0.2 point  
Style *multiplechoicequestion.cc*: 0.2 point  
Documentation: 1 point  
Clean compilation of *truefalsequestion.cc*: 0.2 point  
Clean compilation of *shortanswerquestion.cc*: 0.2 point  
Clean compilation of *multiplechoicequestion.cc*: 0.2 point  
Clean compile/link with *testttf.cc*: 0.1 point  
Clean compile/link with *testsa.cc*: 0.1 point  
Clean compile/link with *testmc1.cc*: 0.1 point  
Clean compile/link with *testmc2.cc*: 0.1 point  
Passes instructor's modified *testttf.cc* tests: 2 points  
Passes instructor's modified *testsa.cc* tests: 2 points  
Passes instructor's modified *testmc1.cc* tests: 1 point  
Passes instructor's modified *testmc2.cc* tests: 2 points

The penalty for late program submissions is 10% per day, with no submission accepted after 3 days.