

Computer Sciences 302
Final Exam Information & Sample Questions

Below you'll find information about the final exam and sample exam questions. This sampling does not represent the length or difficulty of the actual exam. The exam will have more multiple-choice questions and cover a broader range of topics than what is presented here. See the course web pages for a list of exam topics as well as the exam time and rooms. Note the following logistics about the exam:

- The final exam will be composed of two parts, about 3/4ths multiple-choice and 1/4th written questions. For the multiple-choice part, we'll provide a bonus question, but there will be no extra credit if you get all of the questions right.
- Note the multiple-choice questions will be cumulative and the written questions will focus on the material since the second exam (but they are still dependent on earlier programming concepts).
- The exam is designed to be 120 minutes in length. *There will not be additional time* for the final exam. Use your time wisely. You'll be required to turn in your exam after two hours.
- As with prior exams, we'll provide descriptions of common methods for select classes from the Java API where needed. For this sample you should use the Java API documentation and your textbook as needed.
- You may not use textbooks, notes, neighbors, calculators, or other electronic devices on the exam.
- Bring several #2 pencils and **your UW ID** to the exam.
- Sit in columns with an empty seat or an aisle to your right and left.
- Before the exam begins, pick up a scantron form and write on it your **UW ID number** (*be careful, this is required to upload your score into Learn@UW*). Then drop off your UW ID at the front of the room and fill in your name and other information as described on the exam.
- When you're done, turn in your exam and scantron form, and pick up your UW ID.

When the exam starts, check the written questions and make sure to allocate sufficient time to complete them. We recommend that you first work on the multiple-choice questions that you feel confident answering. Second, read through the written questions and spend some time working on them. Then, go back and answer the remaining multiple-choice questions. Finish by completing your work on the written questions. Be careful not to be stubborn or get stuck on a question. If you're having difficulty, go on to the next question.

Part I Sample Multiple-Choice Questions

Questions 1 - 8 show examples of multiple choice questions for material up to the second exam. Questions 9 - 13 are on the new material. For questions for material from the first exam, see the actual exam and the sample questions that were provided.

1.) Assume a class named `Movie` has a method named `getTitle` that returns a `Movie` object's title. Also assume an array named `database` has been filled with `Movie` objects. Which one of the following correctly tests whether the title of the first movie in the database is equal to "Koyaanisqatsi"?

A. `database[0].getTitle() == "Koyaanisqatsi"`
B. `database[1].getTitle() == "Koyaanisqatsi"`
C. `database[0].getTitle.equals("Koyaanisqatsi")`
D. `database[1].getTitle.equals("Koyaanisqatsi")`
E. `database[0].getTitle().equals("Koyaanisqatsi")`

2.) Consider the following complete implementation of the `Question` class:

```
public class Question {
   public  final double A = 11.22;
   public  double b;
   private double c;
   public void one (double d) {
      this.b = d;
   }
   public double two () {
      return this.c;
   }
   public void three (double e) {
      this.c = e;
   }
}
```

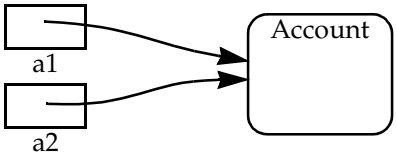
Assume `q` is a properly constructed `Question` object, and it and the statements below are in the main method of an `Exam` class. Which one of the following statements will *not* result in a compiler error?

A. `q.A = 1.1;`
B. `q.one(q.c);`
C. `q.two(q.b);`
D. `double d = q.two(11);`
E. `q.three(q.b);`

3.) Which one of the following statements about Java data types is *false*?

A. Data types are classified into two groups: primitives and references.
B. Java allows arrays of primitive data types and arrays of reference data types.
C. A primitive value is copied whenever it is passed as a parameter or returned from a method.
D. A software object is copied whenever its reference is passed as a parameter or returned from a method.
E. Reference variables can be aliases but primitive variables cannot.

4.) Consider the following memory diagram:



Which one of the following code fragments corresponds with this memory diagram?

A.
```
Account a1, a2;
```
B.
```
Account a1, a2;
a1 = new Account();
```
C.
```
Account a1, a2 = new Account();
```
D.
```
Account a1 = new Account();
Account a2 = new Account();
```
E.
```
Account a1 = new Account();
Account a2;
a2 = a1;
```

5.) Consider the following complete implementation of the `Data` class:

```
public class Data {
   private int data;
   public  int get () {
      return data;
   }
   public  void set (int d) {
      data = d;
   }
}
```

Also consider the following application class:

```
public class DataApp {
   public static void main(String[] args) {
      int data = 11;
      Data d1 = new Data();
      d1.set(data);
      Data d2 = d1;
      method(d1);
      data = d2.get();
      d2 = new Data();
      d2.set(33);
      System.out.println(data + ", " + d1.get() + ", " + d2.get());
   }
   public static void method(Data d) {
      d.set(22);
   }
}
```

What is printed when the `DataApp` program is executed?

A. `11, 11, 33`
B. `11, 33, 33`
C. `22, 22, 33`
D. `22, 33, 33`
E. `33, 33, 33`

The questions on this page are based on the following code and each question has only FOUR choices:

```
class SemesterRecord {
   private ArrayList<Course> courses;
   private int i;
   public  SemesterRecord()        { this.courses = new ArrayList<Course>();  }
   public  void    addCourse(Course c) { //SEE QUESTION BELOW                  }
   public  int     getSize()       { return this.courses.size();              }
   public  void    rewind()        { this.i = 0;                              }
   public  boolean hasNext()       { return this.i < this.courses.size();     }
   public  Course  getNext()       { Course c = this.courses.get(this.i);
                                     this.i++;
                                     return c;
                                   }
}
class Course {
   private String name;
   private int    credits;
   public  Course(String n, int c) { this.name = n; this.credits = c;         }
   public  String getName()        { return this.name;                        }
   public  int    getCredits()     { return this.credits;                     }
}
```

6.) Assume that a `SemesterRecord`, named `sm`, has been properly constructed and 0 or more `Course` objects have been added to it. Consider the code fragment below that is intended to find the position of a course named "cs302" if it is in the semester record:

```
int found = -1;
sm.rewind();
for (int i = 0; CONDITION1; i++) {
   if (CONDITION2) {
      found = i;
   }
}
```

Which one of the following replacements for `CONDITION1` and `CONDITION2` when used to complete the code fragment above will ensure that it works as described?

	CONDITION1	CONDITION2
A.	`sm.hasNext()`	`sm.getName() == "cs302"`
B.	`sm.hasNext()`	`sm.getNext().getName().equals("cs302")`
C.	`i < sm.getSize()`	`sm.getNext().getName() == "cs302"`
D.	`i < sm.getSize()`	`sm.getName().equals("cs302")`

7.) Which one of the statements below, when added to the body of the `addCourse` method above correctly adds the course to beginning of a `SemesterRecord` object?

A. `courses.add(c);`
B. `return this.courses.add(c);`
C. `this.courses.add(0, c);`
D. `return this.courses.add(0, c);`

8.) Which one of the following method headers would result in overloading when its method is added to the `SemesterRecord` class above?

A. `public void addCourse(Course c, int index)`
B. `public boolean rewind()`
C. `public Course getCourse(int index)`
D. `private Course getNext()`

The questions on this page are based on the following *partially shown* code:

```
class Exceptions {

   public static void main(String[] args){

      methodX();
      try {
         //LINE A - see questions below
      } catch (NullPointerException x) {
         System.out.print("Error 1,");
      } catch (IndexOutOfBoundsException x) {
         System.out.print("Error 2,");
      }
      System.out.print("main done,");
   }

   public static void methodX() {
      try {
         //LINE B - see questions below
         methodY();
      } catch (NullPointerException x) {
         System.out.print("Error 3,");
      }
      System.out.print("methodX done,");
   }

   public static void methodY() {
      try {
         //LINE C - see questions below
      } catch (ArithmeticException x) {
         System.out.print("Error 4,");
      }
      System.out.print("methodY done,");
   }
}
```

9.) What is output if LINE A is replaced with code that will throw a `NullPointerException`:

A. `Error 1,main done,`
B. `methodY done,methodX done,Error 1,`
C. `methodY done,methodX done,Error 1,main done,`
D. `methodY done,Error 3,methodX done,main done,`
E. The program crashes and message about the exception is displayed.

10.) What is output if LINE B is replaced with code that will throw an `IndexOutOfBoundsException`:

A. `Error 2,`
B. `Error 2,main done,`
C. `methodY done,Error 2,main done,`
D. `methodY done,methodX done,Error 2,main done,`
E. The program crashes and message about the exception is displayed.

11.) What is output if LINE C is replaced with code that will throw a `NullPointerException`:

A. `Error 4,methodY done,methodX done,main done,`
B. `methodY done,Error 3,methodX done,main done,`
C. `Error 3,methodX done,Error 1,main done,`
D. `Error 3,methodX done,main done,`
E. The program crashes and message about the exception is displayed.

12.) Which one of the following statements about Java exception handling is *false*?

A. There are three categories of exceptions: checked, unchecked, and runtime exceptions.
B. Unchecked exceptions are only detected during runtime.
C. Checked exceptions are checked at compile time and require either a `catch` block or a `throws` clause.
D. Checked exceptions include `FileNotFoundException`.
E. Runtime exceptions would be thrown when dividing a number by 0 or trying to access a null object.

13.) Consider the following code fragment where `fileIn` is a properly constructed `Scanner` object and `fileOut` is a properly constructed `PrintWriter` object:

```
while (fileIn.hasNextLine()) {
   String s = fileIn.nextLine();
   if (s.charAt(0) == '#') { fileOut.println(s); }
}
fileIn.close();
fileOut.close();
```

If `fileIn` opens an input file containing the following:

```
#line1
line2#
##line3
```

Which one would be the contents of the output file after the method has completed?

A. `line2#`
B. `#line1##line3`
C. `line1`
   `line3`
D. `#line1`
   `##line3`
E. `line1`
   `line2#`
   `#line3`

Part II Sample Written Questions

Here are samples of written questions for some of the new material topics. As with the second midterm exam, it is ok to use the following abbreviations `S.o.pln()` for `println` and `S.o.p()` for `print`, and you will *not* need to comment your code. Unlike the second exam, you may ***not*** assume that non-`null` references are passed to methods. If reference parameters are `null` throw an `IllegalArgumentException`.

1.) Complete the method below that is passed two strings, a name of a file and a target line. This method returns `true` if the file contains at least one line that matches the target line, and `false` otherwise. Note your method must include code to properly do the steps needed for file input, but you may assume that any necessary import statements have already been coded.

```
public boolean containsLine (String filename, String target) {
```

2.) Consider the `Timer` class below:

```
public class Timer {

   private int seconds; //legal values: 0 to 59
   private int minutes; //legal values: >= 0
   private int limit;   //legal values: >= 1, or 0 means no limit

   public Timer () {
      seconds = minutes = limit = 0;
   }

   public void reset() {
      seconds = minutes = 0;
   }

   public boolean tick() {
      seconds++;
      if (seconds >= 60) {
         seconds = 0;
         minutes++;
      }
      if (limit != 0 && minutes >= limit) {
         //return true;
      }
      //return false;
   }

   public void setLimit(int limit) {
      if (limit >= 0) {
         this.limit = limit;
      }
   }

   public int getSeconds() {
      return seconds;
   }

   public int getMinutes() {
      return minutes;
   }

}
```

A. Modify the code above so that it implements the `Comparable` interface. Show the changes and additions needed to the right of the code above. Note you do not need to rewrite the entire class, just show the modifications.

B. Assume two `Timer` objects have been created, named `t1` and `t2`. Write a code fragment that displays the minutes and seconds of the timer with the lowest time or "Tie" if they are the same time.

C. Rewrite the `tick` method so that, rather than returning a boolean value, it throws an `AlarmTriggeredException` when the minutes value reaches the limit. You may assume the `AlarmTriggeredException` class has been coded and extends the `Exception` class.

D. Rewrite the code below so that it is functionally equivalent but uses the new version of `tick` as described in part C above.

```
while (!t1.tick()) {
   System.out.println("tick");
}
t1.reset();
```