THE UNIVERSITY OF BRITISH COLUMBIA
CPSC 310: SAMPLE MIDTERM #3

Name: _____ **Student #:** _____

Signature: _____

Notes about this examination

1. You have 60 minutes to write this examination.
2. No notes, books, or any type of electronic equipment is allowed, including cell phones and calculators.
3. Good luck!

	Marks	Max
Multiple Choice		**10**
True/False		**10**
11		**5**
12		**5**
13		**4**
14		**6**
15		**4**
16		**5**
17		**6**
Total		**55**

Rules Governing Formal Examinations

1. Each candidate must be prepared to produce, upon request, a UBCcard for identification.
2. Candidates are not permitted to ask questions of the invigilators, except in cases of supposed errors or ambiguities in examination questions.
3. No candidate shall be permitted to enter the examination room after the expiration of one-half hour from the scheduled starting time, or to leave during the first half hour of the examination.
4. Candidates suspected of any of the following, or similar, dishonest practices shall be immediately dismissed from the examination and shall be liable to disciplinary action.
    - Having at the place of writing any books, papers or memoranda, calculators, computers, sound or image players/recorders/transmitters (including telephones), or other memory aid devices, other than those authorized by the examiners.
    - Speaking or communicating with other candidates.
    - Purposely exposing written papers to the view of other candidates. The plea of accident or forgetfulness shall not be received.
5. Candidates must not destroy or mutilate any examination material; must hand in all examination papers; and must not take any examination material from the examination room without permission of the invigilator.
6. Candidates must follow any additional examination rules or directions communicated by the instructor or invigilator.

Multiple Choice – select the *best* answer for each question.

1. **[2 marks]** Which of the following sentences does not describe a type of informal code review?

    a) One developer looks over the author's shoulder as the latter walks through the code.
    b) Source code management system emails code to reviewers automatically after a check-in.
    c) Two authors develop code together at the same workstation.
    d) Authors and reviewers use specialized tools designed for peer code review.
    e) All of the above describe types of informal code reviews.

2. **[2 marks]** Among the following scenarios, which one should not increase the risk of introducing smelly code in to your software?
    a) Multiple people working together on the same software, at the same time
    b) A single developer working long hours close to a deadline
    c) An expert maintenance developer modifying the functionality of an existing class
    d) An experienced team using an agile process
    e) All of the above could introduce smelly code

3. **[2 marks]** Which of the following procedures best describes how refactoring should be performed?

    a) Ensure all tests pass; Select a refactoring that solves as many smells as possible; Perform the refactoring; Ensure all tests still pass; Repeat as needed.
    b) Ensure all tests pass; Find a code smell; Determine a single refactoring operation that would remove that smell; Perform the refactoring; Ensure all tests still pass; Repeat as needed.
    c) Find a code smell; Write a unit test for the code smell and make sure it fails; Determine the refactoring that solves the smell; Perform the refactoring; Ensure the new test now passes; Repeat as needed.
    d) Find a defect in the Jazz repository; Run the software to reproduce the defect; Identify the defect location using the debugger; Refactor to solve the defect; Run the software to make sure the defect is gone; Repeat as needed.
    e) Ensure all tests pass; Choose a refactoring; Find a code smell for that refactoring; Perform the refactoring; Ensure all tests pass; Repeat as needed.

4. **[2 marks]** If you have written some software that uses an open source library, you

    a) must license your software using the same license as the open source library you used
    b) can use any license that you wish for your software
    c) cannot commercialize your software
    d) may be able to choose which license to use for your software, depending on which license the open source library uses

5. **[2 marks]** Name the design pattern used in the following example

```
public class SearchFactory {
      private static SearchFactory searchFactory = null;

      protected SearchFactory() {

      }

      public static SearchFactory getSearchFactory() {
            if (searchFactory == null)
                  searchFactory = new SearchFactory();
            return searchFactory;
      }

      public SearchDialog getSearchDialog(){
            return new GoToDialog();;
      }
}
```

   a. Singleton
   b. Abstract Factory
   c. Facade
   d. Composite
   e. None of the above.

True/False

For each true/false question below provide a *one sentence* justification of your answer.

6. **[2 marks]** As long as you have a reasonably small development team, you will be able to develop a product more quickly using XP than the traditional waterfall model.

7. **[2 marks]** Every time you see an opportunity to apply a refactoring in your code, best practices dictate that you should apply the refactoring.

8. **[2 marks]** When you're using version control to manage a team project, you should assign each class to a particular developer to minimize the conflicts when the code is checked-in (or delivered).

9. **[2 marks]** Pair programming, refactoring and code reviews are all mechanisms that can improve code quality.

10. **[2 marks]** When you associate a delivery in Jazz with a Work Item, the change sets that you delivered are listed in the Work Item. This is an easy way to track the changes that your teammates have completed.

Short Answer

11. **[5 marks]** What smells you notice in the following code? Which of the smells is the most important? Apply a refactoring that addresses the most important code smell. *Briefly* explain the reasoning behind the refactoring you made. (You may want to do some scratch work on the back of the page!)

```
public class Accord extends Car{
      // the rest of the code is not shown

      public int getPrice(Customer c) {
            return 25000 - // base price
                  2500 + // November discount
                  (distanceToTravel * costPerKM); // freight cost
            }
}

public class Civic extends Car {
      // the rest of the code is not shown

      public int getCost(Customer c) {
            return 20000 - // base price
                  (c.isRepeat() ? 1000 : 0) + // loyalty discount
                  this.getFreightCost();
      }
}
```

12. **[5 marks]** Which of the design patterns that we've discussed would you use if you were designing the system described below? Draw a class diagram showing how you would apply the design pattern in this particular situation. In other words, what classes would you need to create and how do they correspond to the "Participants" of the design pattern (as shown in the Appendix).

    Your class diagram only needs to show how you would apply the design pattern – it does not need to be a design for the entire system.

    Chess is played by two players, each taking turns moving pieces on a chess board. Each player can take at most 5 minutes to make his/her move. A timer keeps track of the remaining time for each move. When a player makes a move, the timer must reset to 5 minutes.

13. **[4 marks]** What are two problems that you may have as a software developer that version control software can solve for you? How would version control software solve each of the problems?

14. In the lecture notes, "less focus on design" was given as a drawback of feature-driven development.
    a. **[3 marks]** Why might a team using feature driven development focus less on design than a team that wasn't using feature-drive development?

    b. **[3 marks]** If you were working in a team that used feature-driven development, what would you recommend that your team do to mitigate this problem?

15. **[4 marks]** In the Open Source guest lecture, Rob Elves encouraged you to get involved with an open source project. How could getting involved in an open source project benefit you in your future career as a software engineer? (assuming that you want to work as a software engineer!)

16. **[5 marks]** Imagine that you have been hired as a technical director for a new project in a well-established software development company. One of your first duties is to choose a software development process for your team. What factors will you consider when you are making your decision? (list at least 3) For each factor, explain why it is an important factor for you to consider.

17. **[6 marks]** What software development process should a team of eight professional software developers use if they are developing a new web-based email client to compete with gmail?

    Note, there isn't just one correct answer, pick what you think is the most appropriate process and clearly justify your choice. The models we have discussed are Waterfall, Parallel Waterfall, Subsystem Waterfall, Staged Delivery, Spiral, XP, and Scrum.