

COMP 4081  
**Exam 2**  
Fall 2016

Name: \_\_\_\_\_,  
Last name First name

**Rules:**

- No potty breaks.
- Turn off cell phones/devices.
- Closed book, closed note, closed neighbor.
- WEIRD! Do not write on the backs of pages. If you need more pages, ask me for some.

**Reminders:**

- Verify that you have all pages.
- Don't forget to write your name.
- Read each question carefully.
- Don't forget to answer every question.

1. [2pts] Which term is best defined by the following text?

*Development of a system through repeated cycles and in smaller portions at a time, allowing software developers to take advantage of what was learned during development of earlier parts or versions of the system*

- a) Verification and validation
- b) Waterfall development process
- c) Configuration management
- d) Iterative development process
- e) None of the above

2. [2pts] Which term is best defined by the following text?

*Development of a system whereby progress is seen as flowing steadily downwards through the phases of conception, analysis, design, construction, testing, production, and maintenance, and wherein one should move to a phase only when its preceding phase is reviewed and verified*

- a) Verification and validation
- b) Waterfall development process
- c) Configuration management
- d) Iterative development process
- e) None of the above

3. [2pts] Which of the following is an issue associated with the waterfall development process?

- a) Can lead to “analysis paralysis” wherein a considerable investment of time and effort is put into a project before any code is written
- b) System defects are often discovered late in the development process
- c) Falsely assumes that requirements are stable and can be known from the start
- d) All of the above
- e) None of the above





8. [2pts] T or F? The larger the estimate, the more likely it is to be accurate.

- a) True
- b) False

9. [2pts] T or F? To estimate work, developers commonly use their own past performance and/or the “wisdom of the crowd.”

- a) True
- b) False

10. [6pts] Match the Design Pattern to an example usage of the pattern.

- |           |                       |                       |  |
|-----------|-----------------------|-----------------------|--|
| Builder   | <input type="radio"/> | <input type="radio"/> | Your Call of Duty program needs to listen for keyboard and mouse clicks to manipulate how a player character moves, shoots, etc.   |
| Memento   | <input type="radio"/> | <input type="radio"/> | Your web app must log data from many different places in its code, but only one Logger object should do the logging for the entire system.   |
| Adapter   | <input type="radio"/> | <input type="radio"/> | You want your application to save its state so that if it crashes, then it can auto-recover.   |
| Observer  | <input type="radio"/> | <input type="radio"/> | Your application needs to generate large, complex XML files (from scratch).  |
| Singleton | <input type="radio"/> | <input type="radio"/> | Your program must support switching among several different database management system libraries (e.g., MySQL, PostgreSQL, SQLite), but each one has a slightly different interface. |



12. [2pts] Which of the following is true of *exhaustive testing*?
- a) Tests all possible inputs
  - b) Typically results in an intractably large set of test cases even for small programs
  - c) Generally infeasible in practice
  - d) All of the above
  - e) None of the above
13. [2pts] Which of the following is not a difference between black-box and white-box testing?
- a) White-box tests are made by programmers, whereas black-box tests are made by ordinary users
  - b) Black-box tests often focus on boundary cases, whereas white-box tests tend not to
  - c) Black-box tests are based only on the interface of a component, whereas white-box tests are based on the implementation
  - d) White-box tests often aim to achieve particular levels of code-coverage, whereas black-box tests do not
  - e) None of the above (they are all differences)
14. [2pts] Which of the following is not a difference between unit tests and integration tests?
- a) Unit tests should not perform I/O, whereas integration tests may do so
  - b) Unit tests should be deterministic, whereas integration tests may have non-determinism
  - c) Unit tests should be fast (less than half a second), whereas integration tests may be slower
  - d) Unit tests must be black-box tests, whereas integration tests must be white-box tests
  - e) None of the above (they are all differences)







Use the CFG you created for the function in Figure 4 to answer the following questions.

17. [2pts] Fill in the table below with a test suite that provides statement coverage. In the Covers column, list the letter labels (A, B, C, etc.) of the nodes covered by each test case.

Input array	Expected Output	Covers

18. [3pts] Fill in the table below with a test suite that provides branch coverage. In the Covers column, list the number labels (1, 2, 3, etc.) of the edges covered by each test case (only true/false edges needed).

Input array	Expected Output	Covers

19. [4pts] Fill in the table below with a test suite that provides path coverage. In the Covers column, list the number labels (1, 2, 3, etc.) of the edges covered by each test case. You need only cover executions that involve at most 1 iteration of each loop (if there are any). Before you fill in the table, list all the paths to be covered.

**Paths:**

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Input array	Expected Output	Covers

20. [2pts] How do you prevent SQL injection attacks?

- a) Escape queries
- b) Interrupt requests
- c) Merge tables
- d) All of the above
- e) None of the above

21. [2pts] What is an effective way to prevent cross-site scripting attacks?

- a) Place your server behind a firewall
- b) Disable all form input
- c) Escape any input text that would be displayed on a webpage
- d) All of the above
- e) None of the above

## Figures

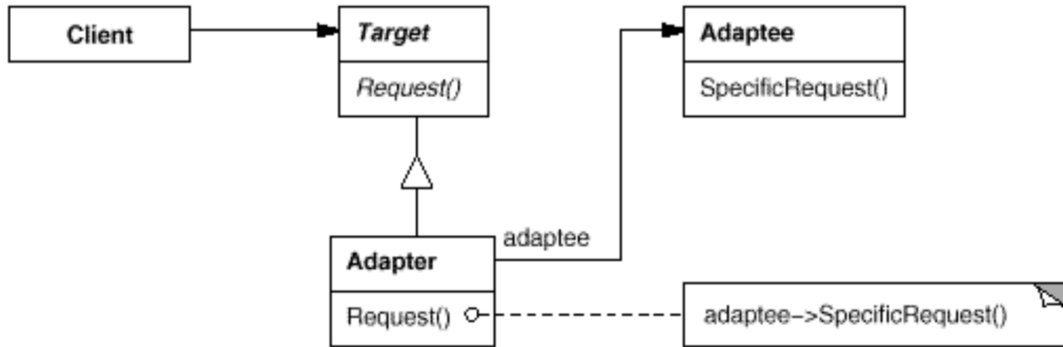


Figure 1. Adapter Pattern from the "Gang of Four" book. (Note that the book uses an outdated class diagram notation.)

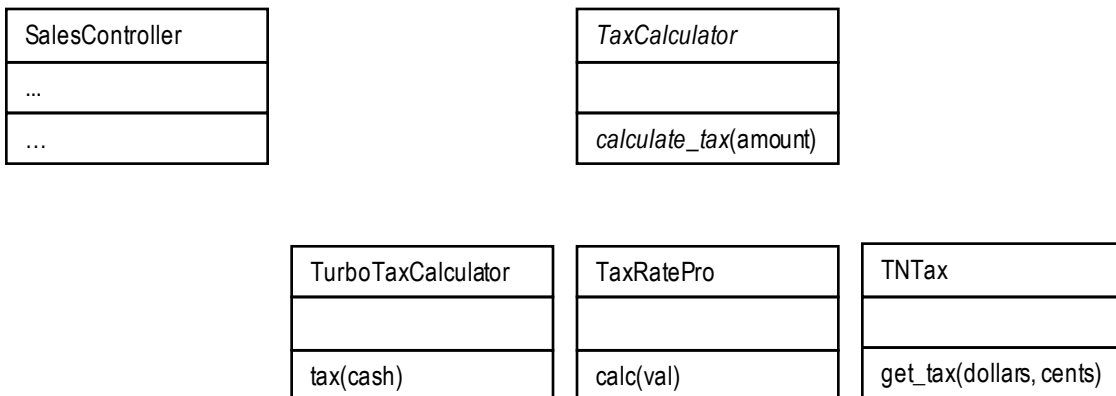


Figure 2. Classes for on-line sales web app.

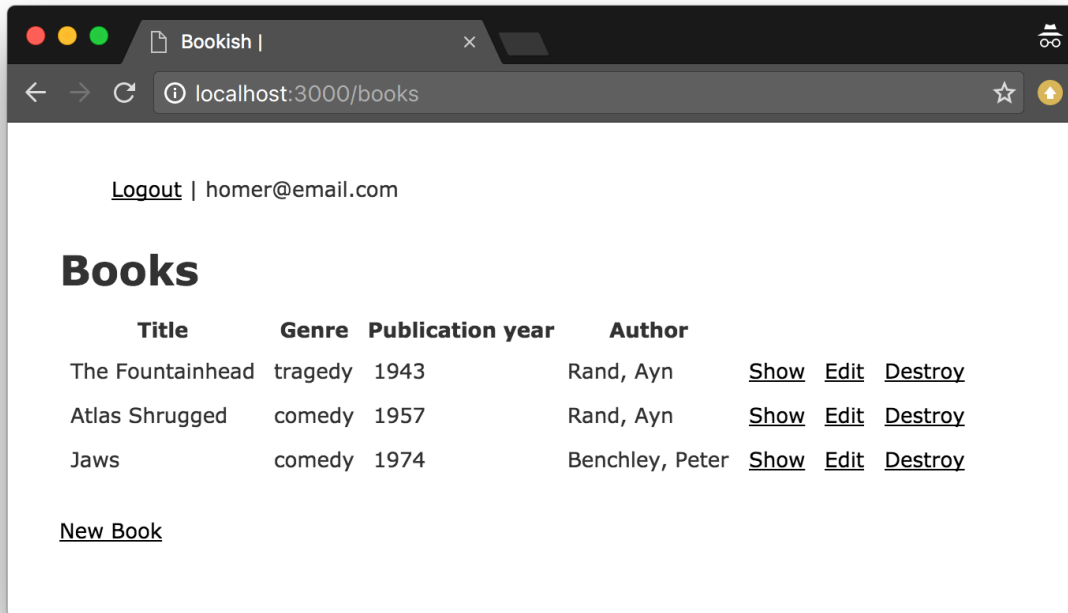


Figure 3. Books index page.

```
def find_smallest(array)
  smallest = array[0]
  i = 1
  while i < array.length
    if array[i] < smallest
      smallest = array[i]
    end
    i = i + 1
  end
  return smallest
end
```

Figure 4. Function that finds the smallest value in an array.