

COMP/EECE 7012

# Exam 2

Spring 2017

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. [8pts] For each piece of text below, place an “I” and/or a “W” next to it if it corresponds to *Iterative* and/or *Waterfall* development process, respectively.

\_\_\_\_\_ A structure imposed on the development of a software product

\_\_\_\_\_ 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

\_\_\_\_\_ 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

\_\_\_\_\_ System defects are often discovered late in the development process

\_\_\_\_\_ Good if your project has unstable requirements (i.e., that are prone to change)

\_\_\_\_\_ Falsely assumes that requirements can be known from the start

\_\_\_\_\_ Can lead to “analysis paralysis” wherein a considerable investment of time and effort is put into a project before any code is written

\_\_\_\_\_ Has an “empirical” process control model

2. [6pts] Think of *Twitter*. Reverse engineer one user story that records a requirement for the system. You must apply the templates described in class, and your US must have the other attributes of good user stories, which we discussed in class. (You may omit the US's estimate and priority.)

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3. [4pts] Describe two things that are wrong with this user story for the *Piazza* system we used in class.

jQuery Rich Text Editor The create-post page must have a jQuery rich text editor widget for editing the details text of the post.
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8. [2pts] For each piece of text below, place a “B” or a “W” next to it if it corresponds to *Black-Box* or *White-Box* testing, respectively.

\_\_\_\_\_ Tests based on the implementation of a component

\_\_\_\_\_ Tests based only on the interface of a component

\_\_\_\_\_ Tests focus on boundary cases

\_\_\_\_\_ Tests aim to achieve particular levels of code-coverage

9. [2pts] For each piece of text below, place a “U” and/or “I” and/or “S” next to it if it corresponds to *Unit* and/or *Integration* and/or *System* tests, respectively.

\_\_\_\_\_ May have non-determinism

\_\_\_\_\_ Should not perform I/O

\_\_\_\_\_ Tests the whole system

\_\_\_\_\_ Should be fast (less than half a second)

10. [8pts] Using the fragments below, create a functional test (class and method) for the “index” page of a music-themed web app (which has the typical scaffold layout). The test should do the following in this order (1) retrieve user fixture “two” and sign in the user, (2) simulate an HTTP request for the index page, (3) check that the HTTP response does not report an error, (4) check that the rendered HTML table contains a cell with the famous singer of “Rolling in the Deep” and “Hello”, and (5) check that the correct ERB is rendered (index.html.erb). Some fragments may be used more than once in your solution. Some fragments may not be used at all.

- a) end
  - b) include Devise::Test::IntegrationHelpers \_\_\_\_\_
  - c) get albums\_url
  - d) get album\_url(@album) \_\_\_\_\_
  - e) assert\_select "h1", "Album"
  - f) assert\_select "td", "Adele" \_\_\_\_\_
  - g) assert\_template :albums
  - h) assert\_template :index \_\_\_\_\_
  - i) assert\_response :error
  - j) assert\_response :success \_\_\_\_\_
  - k) sign\_in user
  - l) album = albums(:two) \_\_\_\_\_
  - m) user = users(:two)
  - n) test "should display albums" do
  - o) class AlbumsControllerTest < ActionController::IntegrationTest \_\_\_\_\_
  - p) class Album < ApplicationRecord \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



Use the CFG you created for the function in Figure 1 to answer the following questions.

12. [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

13. [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



14. [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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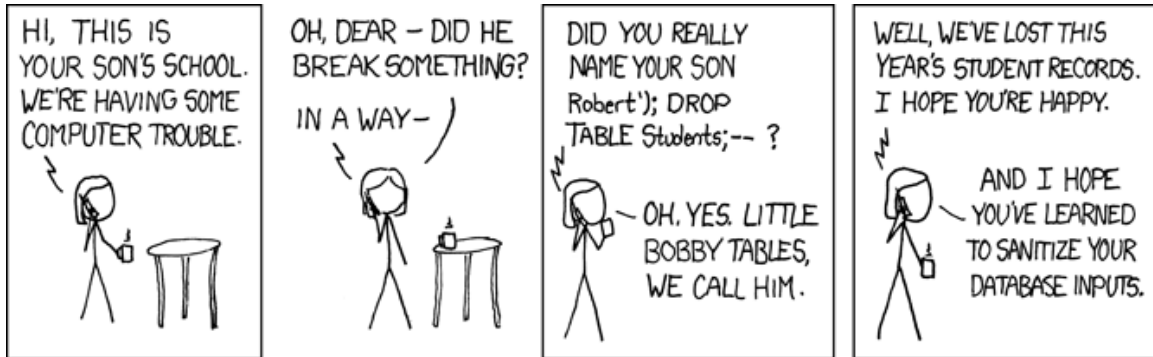
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Input array	Expected Output	Covers

15. [2pts] Which, if any, of your above three test suites would have caught the bug in the function?

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16. [2pts] What type of attack did the parents in this XKCD comic perform?



- a) Reverse lookup
- b) Mask and shift
- c) Cross-site scripting
- d) SQL injection
- e) Child endangerment

17. [2pts] How do you prevent the above attack?

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

18. [5pts] Match the Design Pattern to an example usage of the pattern.

Observer

You want your editor application to allow users to undo edits.

Singleton

Your point-of-sales application must log data from many different places in its code, but only one Logger object should do the logging for the entire system.

Adapter

Your *Doom* program needs to listen for keyboard and mouse clicks to manipulate how a player character moves, shoots, etc.

Builder

Your program must support switching among several different foreign language translation libraries (e.g., FrenchToX, HindiTranslatePro, English4Me), but each one has a slightly different interface.

Memento

Your application needs to generate large, complex PDF files (from scratch).



## Figures

```
def average(array)
  sum = 0
  i = 1
  while i < array.length
    sum = sum + array[i]
    i = i + 1
  end
  return sum/array.length
end
```

**Figure 1. Buggy function that computes the average value of an array of numbers.**

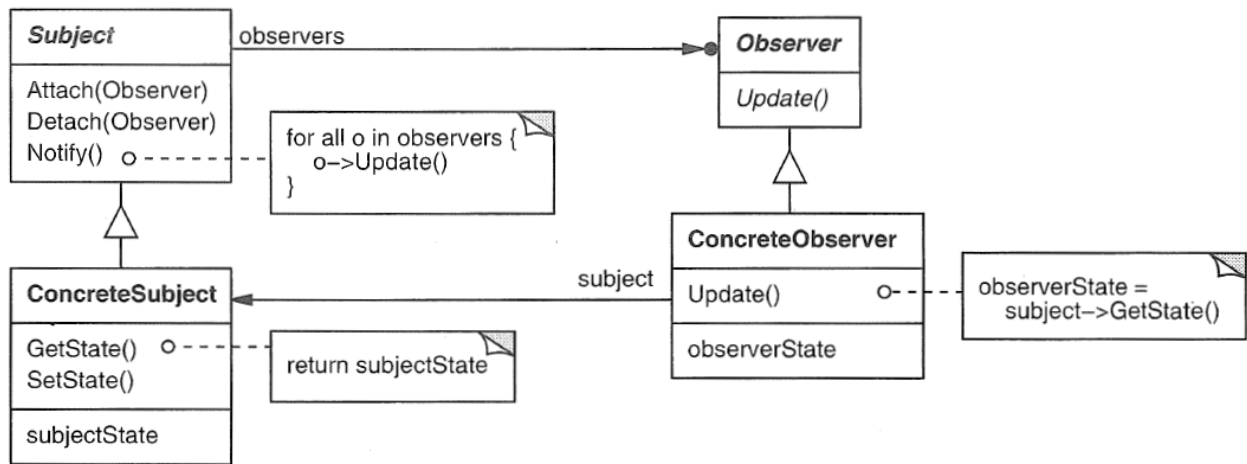


Figure 2. Observer Pattern from the “Gang of Four” book. (Note that the book uses an outdated class diagram notation.)



Figure 3. Classes for product-supply system.