CS307 Exam Fall 2021

(100 points)

Name:_____

ID:_____

Section I: (68pts, 4pts each) **Multiple Choice Problems (the following questions have one or multiple answers)**

1. Select the answer that produces an incorrect statement. ``Software''...
   (A) is cheap to develop (B) is easily reproducible (C) does not 'wear out'

   (D) is intangible (E) is easy to modify

   Answer: A

2. Which of the following is NOT one of the Eight Principles found in the Software Engineering Code of Ethics and Professional Practice?

   (A) Software engineers shall maintain integrity and independence in their professional judgment

   (B) Software engineers shall be fair and supportive of their colleagues

   (C) Software engineers shall place the best interests of their client and employer above all else

   (D) Software engineers shall act consistently with the public interest

   (E) Software engineers shall advance the integrity and reputation of the profession consistent with the public interest

   Answer: C

3. The following are all phases in the waterfall model **except**:
   (A) System refactor (B) System design (C) System maintenance (D) Requirement analysis

   (D) Testing

   Answer: A

4. In SCRUM, the product owner does all of the following **except**:
   (A) Decides on release date and content (B) Represents management to the project

   (C) Accepts or rejects work results (E) Prioritizes features (F) Defines features of the product

   Answer: B

5. True or False: The project charter is the source of requirements for a project.
   (A) True (B) False

   Answer: B

6. Which of the following are artifacts of the scrum methodology:

   (A) Project backlog (B) Burn down chart (C) Project charter (D) Sprint backlog

   Answer:A B C D

7. True or False: git relies on a distributed revision control model.
   (A) True (B) False

   Answer: A

8. Which of the following are continuous delivery (CD) tools discussed in lectures:
   (A) Ansible (B) Jenkins (C) UML (D) Docker (E) Git

   Answer: A B D E

9. All of the following are examples of UML diagrams, **except**:
   (A) State machine diagrams (B) Sequence diagrams (C) Data flow diagrams

   (D) Activity diagrams (E) Class diagrams

   Answer: C

10. Which ones are design patterns in the following:
    (A) Singleton pattern (B) Client-server pattern (C) Factory pattern (D) Visitor Pattern

    (E) Observer pattern

    Answer: A C D E

11. Sequence diagrams generally contain:

    (A) A vertical line, the lifeline, attached to each actor

    (B) Arrows between sender and receiver representing messages

    (C) Objects arranged horizontally

    Answer: A B C

12. Inspection can identify the following error types **except**:
    (A) Module interface errors (B) Badly structured code (C) Boundary value errors

    (D) Usability problems (E) Performance problems

    Answer: D

13. Integration testing methods include:
    (A) Big bang testing (B) Top-down testing (C) Bottom-up testing (D) Acceptance testing

    (E) Black-box testing

    Answer: A B C

14. In integration testing, drivers simulate missing:

    (A) Calls from higher level modules (B) Lower level modules (C) System calls (D) Libraries

    Answer: A

15. Which of the following are coverage criteria in white-box testing:
    (A) Statement coverage (B) Decision coverage (C) Mutation coverage (D) Method coverage

    (E) Path coverage

    Answer: A B E

16. Equivalence class partitioning is a black-box testing method.
    (A) True (B) False

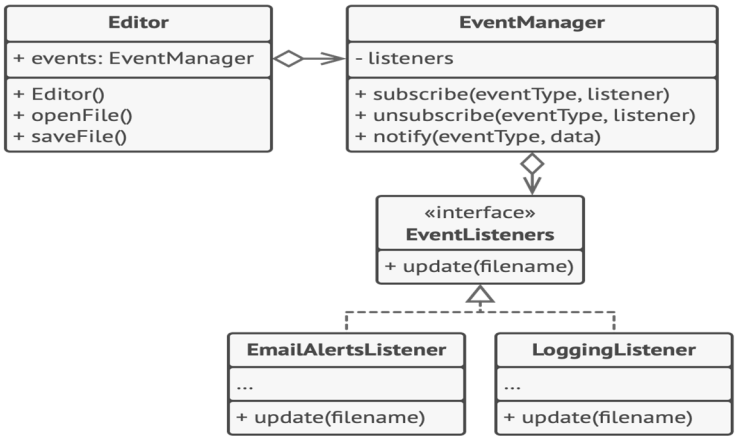
    Answer: A

17. Which ones in the following are software lifecycle models
    (A) Scrum (B) Waterfall (C) Code-and-fix (D) Spiral (E) Prototype

    Answer: A B C D E

Section II: Question Answering (brief answers only)

18. (6pts) What design pattern does the following diagram represent?



Observer

19. (6pts) Assume you want to contribute to an open-source project on Github. Specifically, you want to download the code repo to your local machine, make changes, and upload the changes. What are the typical Git commands you would use to achieve the goal? (You can assume the online repo is X)

Git clone/Git pull

Make changes

Git add

Git commit

Git push

Section III: Diagrams and Computation

20. (10pts) Draw the class diagram for the following class definitions (pay attention to associations)

```
class Bank {
    String name;
    String addr;
    Customer customers […];
};

class Customer {
   int id;
   String name;
   Account accounts […];
};

class Account {
   int id;
   int balance;
};
```

```
class Checking extends Account {
…
};

class Saving extends Account {
   …
};

class Transaction {
  int type;
  Account account;
  Customer customer;
};
```

It should have a box for each class with the names, missing each will take away one point.

Bank to customer is 1 to M

Customer to account is 1 to M

There are extension relations from Account to Checking, from Account to Saving

There are 1-1 relations from Transaction to account, and Transaction to Customer

Having any wrong will take away 1 point. Half-wrong will take way 0.5

21. (10pts) Please compute the statement coverage and decision coverage of the following test suite on the given program. What is the smallest test suite you can generate to achieve 100% statement coverage? Note that your test suite may not need to include the given test cases. Here, function input() receives an input value.

Test inputs: (x=3, y=11), (x=4, y=3)

```
1.  int x=input();
2.  int y=input();
3.  int sum=0;
4.  if (x<10)
5.     sum=sum+x;
6.  if (y<10)
7.     sum=sum+y;
8.  if (sum %2==0)
9.     sum=sum+1;
10. return sum
```

Statement coverage is 9/10 (3pts)

Decision coverage 4/6 (3pts)

The simplest one is:

There are many possible answers. But one input is enough

x=4, y=6 (4pts)