**Answer Key for Exam 1**

**Page 2 of exam (1, 2, 3)**

1. (6) Framework activities are complemented by a number of umbrella activities. Besides software project tracking and control and work product and preparation, name and briefly describe three other umbrella activities that are mentioned in our textbook and in class.

**Ans: (+1 each for any of the following, +1 each for a brief description)**

**Risk management**

**Software quality assurance**

**Technical reviews**

**Measurement**

**Software configuration management**

**Reusability management**

2. (6) In addition to communication and planning, name and describe how the other three additional core framework activities are used in software development?

**Ans (+1 for each activity, +1 for description of each activity):**

**Modeling - Analysis of requirements, design**

**Construction - Code generation, testing**

**Deployment – install and deploy to users, support and maintain**

3. (3) When is the component based development process model used (provide one specific example).

**Ans: (+3 could be any example if it includes developing with commercial off the shelf software (COTS) or components, also needs to be specific example)**

**Developing with existing software i.e. Integrating with COTS**

**Page 3 of exam (4, 5, 6)**

4. (6) Name three reasons the use of the waterfall process model sometimes fail.

**Ans (+2 for each valid reason (must be different reasons)):**

1. **Real projects rarely flow the sequential flow that the model proposes**
2. **Difficult for the customer to state all requirements explicitly**
3. **Customer must have patience. A working version of the program will not be available until late in the project time span**
4. **Software is fast paced and subject to never-ending stream of changes.**
5. **The linear nature of waterfall makes some team members wait for other members of the team to complete dependent tasks**

5. (6) Provide three reasons requirements analysis is difficult.

**Ans: (+2 each for any of the 3 reasons below):**

1. **Domain knowledge: Developers do not know the client's domain, they have different vocabularies**
2. **Representing requirements: Natural language (text, speech) is very imprecise, Other notations may be foreign to the client, sheer volume of documentation**
3. **Clients and customers don't know what they want: Analyst's task to elicit or draw out full details**
4. **Requirements change rapidly: Must keep our ideas current throughout life-cycle, need for tracking and managing requirements**

6. (4) a. What is the difference between a functional and nonfunctional requirement?

   b. Provide an example of a functional requirement for one of the user-types in a law firm's billing system.

   **c.** Provide a nonfunctional requirement **related** to the functional requirement **you provided in item b**.

**Ans: (+1 for correct answer for a., +1.5 for b., +1.5 for c)**

a. **A functional requirement is describing the behavior of the system as it relates to the system's functionality. A non-functional requirement elaborates a characteristic of the system (constraint or some restriction or characteristic imposed on a function or the entire system).**
b. **Functional requirement – Examples (could be others)**

**An attorney (user) can search for a client's charges/bill**

**An attorney (user) can enter a new client.**

**An attorney (user) can enter billable time for a client.**

**An attorney (user) can generate a bill for a client.**

**c. Nonfunctional requirement (must be related to the functional requirement in b.) – Examples (could be others**
**Charges should be updated every 30 minutes.**

**Client's billing information should be accessible 24/7.**

**An attorney could access information from the billing system on mobile devices (Android or iOS)**

**Page 4 of exam (7, 8)**

7. (9) In addition to interviewing clients, name and describe three other information/requirements gathering techniques. Name one advantage and one disadvantage for each technique mentioned.

**Ans: (+1 for any three of the following techniques, +1 for each advantage of the technique given, +1 for each disadvantage of the technique given)**

**-Focus Groups – meeting with a group of users**

**A – Getting input from many people at one time**

**D - Group think, some people may over power others or talk too much and not give others the chance to talk**

**-Questionnaires – sending out paper or digital questionnaires/surveys asking questions**

**A – Ask questions to many people**

**D – Unable to ask follow up questions or more in-depth questions**

**-Scenarios - story boards (in OOA, use-cases)**

**A – More customer focused, maybe easier to understand for clients**

**D – Will need to teach clients about story boards and use cases, may not be focused enough for designers**

**-Rapid Prototyping**

**A – quick to make/ gives users something to look at**

**D – users think it is the actual system**

**-System documentation**

**A – Can look at documentation at any time and not have to coordinate time with clients and stakeholders.**

**D – May not be updated and doesn't give the complete overview**

**-Analysis of existing systems - Similar systems (perhaps from competitors), an older system to be updated**

**A – Great for getting familiar with the domain**

**D – May not be exactly what the clients need or want**

**-Getting information from marketing instead (or in addition) to a client**

**A – Quicker an ore focused and only dealing with one group of users**

**D – May not include a complete perspective of system**

**-Formal meetings between clients, marketing, developers - Joint Application Design (JAD)**

**A – Different perspectives - more complete requirements**

**D – Takes more time as there are more people involved**

8. (4) Provide <u>two</u> ways UML has improved software development?

**Ans: (+2 for each reason stated (must be different reasons))**

**Offers a standard set of models/diagrams for designers which makes it easier than using multiple types of models/diagrams**

**Standard diagrams make it easier to communicate with the users/clients**

**Page 5 of exam (9, 10, 11)**

9. (8) What do the following terms mean in agile development, specifically Scrum:
   a. User stories
   b. Sprint
   c. Product Backlog
   d. Burndown chart

**Ans: +2 for each definition/description**

**a. User stories - Description of software features from an end-user perspective**
**b. Sprint - Work occurs in sprints (designated time intervals – for example, daily, weekly or some time interval)**
**c. Product Backlog – a prioritized list of everything (features) that might be included in a product.**
**d. Burndown chart – A burn down chart is a graphical representation of work left to do versus time.**

10. (4) What is MVC (include description of what it is not just what each letter stands for)?

**Ans: (+1 description, +.5 for what each letter is (model, view controller, +.5 for description for each letter)**

**Model–View–Controller is a software design architecture or is a software architectural pattern for implementing user interfaces**

**Model - Complete, self-contained representation of object managed by the application**

**View - Responsible for a particular presentation of information from the model**

**Controller - Responsible for interaction issues and may lead to changes in the model and/or May lead to changes in the view**

11. (5) In addition to tools, name and describe the other three layers of software engineering? Which layer is considered the bedrock that supports software engineering?

**Ans: (+1.5 for each layer, +.5 for indicating quality as the bedrock)**
**Methods- provide the technical how-to's for building software. Various tasks such as, communication, requirements analysis, design modeling, program construction, testing and support**
**Process models – process defines a framework that must be established for effective delivery of software engineering technology**
***Quality focus – bedrock that supports software engineering**

**Page 6 of exam (12, 13, 14, 15)**

12. (8) True/False (Circle true or false only, do not write additional information)

    True/False Nose extends unittest to make testing more difficult.

    Reasoning Makes it easier

    True/False The spiral process model incorporates risk management.

    True/False Prototyping can be a process model or a tool that complements the use of any process model.

    True/False Requirements specification is also known as customer oriented requirements.

    Reasoning: Requirements specification is known as developer oriented

13. (4.5) Besides being agile, describe any three of the eight principles that we discussed in class that should guide process in software development.

**Ans: (+1.5 each for any 3 of the following principles)**

**Principle #2. *Focus on quality at every step.* The exit condition for every process activity, action, and task should focus on the quality of the work product that has been produced.**

**Principle #3. *Be ready to adapt.* Process is not a religious experience and dogma has no place in it. When necessary, adapt your approach to constraints imposed by the problem, the people, and the project itself.**

**Principle #4. *Build an effective team.* Software engineering process and practice are important, but the bottom line is people. Build a self-organizing team that has mutual trust and respect.**

**Principle #5. Establish mechanisms for communication and coordination. Projects fail because important information falls into the cracks and/or stakeholders fail to coordinate their efforts to create a successful end product.**

**Principle #6. Manage change. The approach may be either formal or informal, but mechanisms must be established to manage the way changes are requested, assessed, approved and implemented.**

**Principle #7. Assess risk. Lots of things can go wrong as software is being developed. It's essential that you establish contingency plans.**

**Principle #8. Create work products that provide value for others. Create only those work products that provide value for other process activities, actions or tasks.**

14. (4.5) Besides establishing a sense of purpose and instilling a sense of involvement name and describe the three other attributes of an effective software team?

**Ans: (+1.5 for each attributes (+.5 for each attribute, +1 or each description)**

**Fostering a sense of improvement**

**Foster a sense of trust**

**Diverse skill sets**

15. (2) Name one reason the “b flag used when opening a file in Python?

**Ans: (+2 for one of the following reasons):**

**First, the "b" flag is used when opening a file to process its contents as data values (*bytes*) and not as strings.**

**Or**

**Second, some libraries expect byte-sequences and not Unicode strings**

**Page 7 of exam (16, 17, 18)**

16. Matching (10)

| Match the term with the correct definition or example | | |
|---|---|---|
| **D** | Asymmetric encryption | A. takes a string and produces a fixed-length string based on the input |
| **E** | JSON | B. uses a single secret key that needs to be shared among the people who needs to receive the encrypted message |
| **B** | Symmetric encryption | C. an isolated working copy of Python which allows you to work on a specific project without worry of affecting other projects |
| **A** | Hash function | D. uses a pair of public key, and a private key to encrypt and decrypt messages when communicating |
| **C** | Virtualenv | E. stores data as strings |

17. (2.5) What is the output of the following Python code?

```
>>> s = "[11, 2, 30, 9, 23]"
>>> values = eval(s)
>>> print(values[1], len(values))
```

Output:

**2 5**

18. (7.5) Create an UML use case diagram for the following scenario:

**Aloha State University (ASU) On-line Registration System**
Professors indicate which courses they will teach online, a catalog can be printed, students can select on-line courses for upcoming semester. No course may have more than 10 students or less than 3 students. When the registration is completed, the system sends information to the billing system. Professors can obtain course rosters on-line. Students can add or drop classes on-line. The Registrar maintains student information, professor information, course information. The Registrar also creates the course catalog.

**Ans: (+.5 for each correct actor (4 actors (stick figures)), .25 for each correct line (going from correct actor to correct case) (8 lines), .5 for each case (7 cases(ovals))) *See diagram below**