S1： Introduction, SaaS Architecture, Ruby and Rails Basics

1. Select the true statement: Agile developers should value:

A. Processes & tools over individuals & interactions

B. Working software over comprehensive documentation

C. Contract negotiation over customer collaboration

D. Following a plan over responding to change

2. What is the difference between Waterfall model and the Spiral model?

A. The Waterfall model involves a lot of planning and long, major phase changes, whereas the Spiral model involves less planning and short phase changes

B. The Waterfall model documents all requirements at the beginning, whereas the Spiral model documents requirements across the iteration as they are needed

C. The Waterfall model has long iterations, whereas the Spiral model has quick and short iterations

D. Assurance testing in the Waterfall model happens after the completion of each phase and in a final verification phase that includes acceptance tests, whereas assurance testing in the Spiral model happens every 2 months

3. What is the worst kind of code?

A. legacy code

B. static code

C. unexpectedly short-lived code

D. beautiful code

4. Every piece of knowledge must have a single, unambiguous, authoritative representation within a system" is an expression of what principle?

A. REST

B. SAAS

C. SOA

D. DRY

5. If a software project is behind schedule, it may not be a good idea to add people in order to catch up because:

A. Programmers are expensive

B. SaaS cannot be built with large teams

C. Communication overhead decreases

D. It takes time to bring new programmers up to speed

6. What is a benefit of the Model-View-Controller (MVC) architecture/design pattern:

A. Supports multi-user access and updating of the model data, with different views for each user

B. Ensures there's a one-to-one mapping from each model to a single view

C. Provides a window into the model and controller for debugging purposes

D. Like most design patterns, it results in more concise code

7. Which productivity mechanism does service-oriented architecture (SOA) best exemplify?

A. Clarity via conciseness

B. Synthesis

C. Reuse

D. Automation and Tools

8. The inability of one service to directly access another service's data is a characteristic of:

A. the Rails framework

B. service-oriented architecture

C. object-oriented programming

D. agile development

9. Suppose we have two HTTP requests in which the URI is the same but the HTTP method (GET vs. POST) is different. Which statement is true regarding Rails routing:

A. The two requests MAY correspond to different controller actions, but don't have to

B. The two requests MUST correspond to different controller actions

C. The two requests MUST correspond to the SAME controller action

D. Rails will throw an error on one of the requests

10. Which are examples of presentation tier elements?

A. Apache HTTP Server, Ruby and Rails, MySQL Database

B. Ruby and Rails, Django, Symfony, Catalyst

C. MySQL Database, PostgreSQL database, Oracle Database

D. Microsoft Internet Information Services, Apache HTTP Server, lighttpd

11. Suppose RottenPotatoes.com wants to launch m.rottenpotatoes.com, an alternate version of the site for mobile clients. If the site was built using an MVC architecture, the majority of the work will go into writing new:

A. models

B. views

C. controllers

D. schema

12. Suppose RottenPotatoes.com wants to add the 'filming location' attribute to each movie on file. This can be achieved by primarily changing what MVC component?

A. the Movie model

B. the view that displays a movie's information

C. the controller that adds a new movie instance

D. none of the above

13. An HTTP request must consist of both a(n) ----- and a(n) -----

A. CRUD action, database

B. header, cookie

C. URL, wildcard (e.g. :id)

D. URI, HTTP request method

14. Which of the following is true regarding Ruby syntax for variable names?

i. Local variables start with $
ii. Instance variables start with @
iii. Class variables start with @@

A. i & iii

B. ii & iii

C. i & ii

D. i, ii & iii

15. If we have the code:

```
a = SavingsAccount.new(100)
b = SavingsAccount.new(50)
c = SavingsAccount.new(75)
```

What is the result of `[a,b,c].sort`?

A. Works, because account balances (numbers) get compared

B. Doesn’t work, but would work if we passed a comparison method to sort

C. Doesn’t work, but would work if we defined <=> on SavingsAccount

D. Doesn’t work: SavingsAccount isn’t a basic Ruby type so can’t compare them

16. Say that we modify the String class to include a method that tells us if a string contains any curvy letters. The method is written as follows:

```
class String
  def curvy?
   !("AEFHIKLMNTVWXYZ".include?(self.upcase))
  end
end
```

How should curvy? be called in our code?

A. String.curvy?("foo")

B. curvy?("foo")

C. self.curvy?("foo")

D. "foo".curvy?

17. When the Ruby expression `foo + bar` is evaluated:

A. bar is passed as an argument to foo's :+ method

B. foo is passed as an argument to bar's :+ method

C. An error will occur because ':+' is only defined for strings and numbers

D. foo and bar will be added together.

18. Which ONE of the following scenarios should NOT be accessible via HTTP GET?

A. A user clicks on a specific photo album on a photo-sharing site to view the album.

B. A user hits the submit button to send an email.

C. A user selects filter criteria to narrow his search results.

D. A user wants to view her moviegoer profile on RottenPotatoes.

19. What does line 4 do in the following code?

```
1 class PostsController < ActionController::Base
2   def add_post
3     # ...code to create new blog post...
4     flash[:notice] = "Post added successfully"
5     redirect_to posts_url
6   end
7 end
```

(i) Writes a message to the log

(ii) Makes the message available to whatever view is rendered for this action

(iii) Persists the message until the next request

A. (ii) only

B. (iii) only

C. (i) and (iii)

D. (ii) and (iii)

20. If a controller action sets an instance variable, the instance variable's value is accessible to:

A. No views

B. Views rendered for this request only

C. Views rendered for this request and the next request

D. Views rendered for this request and all subsequent requests

21. Consider the following sets of code:

(i)

```
    batman_begins = Movie.create(:title => 'Batman
Begins', :release_date => '6/15/2005', :rating => 'PG-13')
```

(ii)

```
    dark_knight = Movie.new
    dark_knight.title = 'The Dark Knight'
    dark_knight.release_date = '7/18/2008'
    dark_knight.rating = 'PG-13'
    dark_knight.save!
```

(iii)

```
    dark_knight_rises = Movie.create
    dark_knight_rises.title = 'The Dark Knight Rises'
    dark_knight_rises.release_date = '7/20/2012'
    dark_knight_rises.rating = 'PG-13'
```

Which of the following will properly add a new movie entry to the database?

A. (i) and (ii)

B. (i) and (iii)

C. (ii) and (iii)

D. (i), (ii), and (iii)

22. Extending RottenPotatoes filtering: Ben Bitdiddle wants to extend RottenPotatoes by combining text search for titles with the already-implemented filtering on rating and sorting by column. His idea is to add a field for search terms alongside the Ratings checkboxes. Ben's goal is that within the controller, params[:search_terms] should hold the search text entered by the user, so for example, params might look like this:

```
    params = { :ratings => { "PG" => "1" }, :search_terms =>
"world" }
```

Which of the following form tags would give this result?

A. <input type="text" params="search_terms"/>

B. <input type="text” name="search_terms"/>

C. <input type="text" id="search_terms"/>

D. <input type="text" name="params[search_terms]"/>

23. RESTful route: Assuming the index action receives the form submission with the params hash shown in the previous question, which of the following approaches would be considered the LEAST RESTful way to handle returning results for a text-search-filtered movie list?

A. Don't render any view; instead Redirect to the movies index page with a URI such as `/index?search_terms=world&rating[PG]=1`

B. Render the existing movies index page with results matching “world”, sorted by release date and filtered by rating "PG", but with the same URI /index

C. Create a new controller action `MoviesController#search`, create a new route match `'/search/:ratings/:search_terms', 'MoviesController#search'` and then redirect to `/search/PG/world`

D. Render an XML response representing the movies matching “world” and filtered by ratings, “G”, “PG”, and “PG-13”

24-26. The next 3 questions are based on the following code, which shows three candidates for a method that returns a string of the movie's title and release year, for example, "Star Wars - 1977". (You may assume that a movie’s release_date is always a valid Ruby Time instance, and that calling year on a Time instance returns its year as an integer.)

```
class Movie < ActiveRecord::Base
  # reminder: database columns are id, title, rating, release_date
  # method 1:
  def title_with_year_1
    "#{self.title} - #{self.release_date.year}"
  end
  # method 2:
  def title_with_year_2
    "#{title} - #{release_date.year}"
  end
  # method 3:
  def title_with_year_3
    "#{@title} - #{@release_date.year}"
  end
end
```

24. Which statement best describes the behavior of Method 1?

A． It will work as intended

B． It will not work as intended

25. Which statement best describes the behavior of Method 2?

A． It will work as intended

B． It will not work as intended

26. Which statement best describes the behavior of Method 3?

A． It will work as intended

B． It will work as intended if we add attr_accessor :title, :release_date to the model code

C． It will not work as intended even if we add attr_accessor to the model code

S2：Behavioral Driven Design (BDD) and Test Driven Design (TDD)

1. Why do many software projects fail?

(i) They don't do what customers want

(ii) They are late

(iii) They are over budget

(iv) They are easy to maintain and evolve

A. i and ii

B. iii and iv

C. i, ii, and iii

D. i, ii, iii, and iv

2. What is the main difference between BDD and TDD?

A. BDD focuses on validation while TDD focuses on verification

B. BDD focuses on verification while TDD focuses on validation

C. BDD is better at testing methods independently than TDD

D. BDD generally uses mocks and stubs more than TDD

3. Which of the following are downsides of BDD?

(i) The cost from customer interaction

(ii) Customer satisfaction does not mean good architecture

(iii) Tests are done prior to coding

(iv) Lack of tools

A. i and ii

B. iii and iv

C. ii and iii

D. i, ii, iii, and iv

4. Which of the features below is SMART?
    A. Users can search for a movie by title
    B. As a customer, I want to see the top 10 movies sold sorted by price so that I can buy the cheapest ones first
    C. Rotten Potatoes should have a good User Interface
    D. Rotten Potatoes should have a good User Interface with a good response time

5. Which of the following is true about user stories?
    (i) they should describe how the application is expected to be used
    (ii) they should have business value
    (iii) they do not need to be testable
    (iv) they should be implemented across multiple iterations of the Agile lifecycle

    A. i only
    B. i and ii
    C. i and iv
    D. i, iii, and iv

6. A _____ refers to a single _____ with one or more ______, each of which is composed of a sequence of ______
    A. feature, step, user stories, scenarios
    B. feature, scenario, steps, user stories
    C. user story, feature, scenarios, steps
    D. user story, scenario, features, steps

7. In contrast to imperative scenarios, declarative scenarios:
    A. tend to have complicated statements and steps
    B. are non-DRY
    C. are shorter, easier to understand, and easier to maintain
    D. focus on the low-level steps you need to set up and perform the test

8. Which if the following is true about implicit requirements and explicit requirements?
    A. You cannot write user stories for both explicit and implicit requirements
    B. Implicit requirements tend to be more concise, while explicit requirements tend to be more verbose
    C. Implicit requirements are the logical consequence of explicit requirements, and typically correspond to integration tests
    D. Explicit requirements are usually defined with imperative scenarios and implicit requirements are usually defined with declarative scenarios

9. Sally realizes that eventually, users of her website might want to create a blacklist of other users that they definitely don't want to be matched. She realizes however that this feature is not high priority and decides to eventually implement it in a couple of

months. She writes tests for this feature to be used eventually. What FIRST principle is clearly not being followed?

A. Fast
B. Independent
C. Repeatable
D. Self-checking
E. Timely

10. Sally wants her website to have a special layout on the first Tuesday of every month. She has the following controller and test code:

```
# HomeController
def index
  if Time.now.tuesday?
    render 'special index'
  else
    render 'index'
  end
end

# HomeControllerSpec
it 'should render special template on Tuesdays' do
  get 'index'
  if Time.now.tuesday?
    response.should render_template('special_index')
  else
    response.should render_template('index')
  end
end
```

What FIRST principle is clearly not being followed?

A. Fast
B. Independent
C. Repeatable
D. Self-checking
E. Timely

11. Which of the following guarantees that you have *exhaustively* unit-tested a piece of code?

A. 100% C0 (statement) coverage
B. 100% C1 (branch) coverage
C. 100% C2 (path) coverage
D. None of the above

12. To test, you introduce deliberate errors into the code to see if tests break. This is which kind of testing?
    A. mutation test
    B. definition-use (DU) test
    C. black-box test
    D. fuzz test

13. Which of the following lists the kinds of tests in order of **increasing** code exercise complexity?
    A. unit tests, functional or module tests, integration tests
    B. integration tests, functional or module tests, unit tests
    C. unit tests, integration tests, functional or module tests
    D. functional or module tests, unit tests, integration tests

14. Which of the following is NOT true about TDD?
    A. Views cannot be tested with TDD
    B. You write a test case before writing the code to be tested
    C. You can use TDD in conjunction with BDD
    D. TDD can help make your code more tested, modular, and readable

S3：Productivity, Legacy Software, Teams, JavaScript and Design Patterns

1. Which techniques are likely to be helpful in exploring a piece of legacy code?
    i. check out a scratch branch / mount a scratch monkey
    ii. watch the customer use the software
    iii. run the test suite, if there is one
    iv. check informal design documents (wikis, commit logs, and so on)'
    A. (iii) and (iv) only
    B. (i) and (ii) only
    C. (i), (ii), and (iv) only
    D. (i), (ii), (iii), and (iv)

2. While performing high-level exploration of legacy code, which statement can you reasonably expect to be TRUE?
    A. Exploration is a reasonable time to fix minor aesthetic problems in the code
    B. Once you discover important collaborations between classes, you'll be able to stub them easily
    C. You should create tests that capture the way the software works now, even if the tests exercise bugs and ugly features
    D. If design documents are available, you can use them to establish the "ground truth" of how the code behaves

3. Which statements are TRUE regarding characterization tests?
    A. You can only create them at the integration-test level, since you don't yet understand the class- or method-level logic of the software.

B. You can create them by writing a test you know will fail, then replacing the failed expectation with the app's observed behavior.

C. As you watch a customer interact with the application, the customer should write tests representing their interactions.

D. You can only run characterization tests against the app in development mode.

4. Which is NOT a challenge of preparing to modify legacy code?

   A. It may run in production but be difficult to fire up in a development environment

   B. It may have failing or obsolete tests in its test suite

   C. The customer may be unsure of what enhancements are most important

   D. There may be hidden bugs that haven't yet been triggered by a customer use case and for which no test exists

5. Which statements are TRUE comparing the following two versions of the same code:

```
# version 1:               # version 2:
def foo(x,y)               def foo(x,y)
  if x                       if x
    if y                       check_y_z(y)
      z()                    else
    end                        check_y_w(y)
  else                       end
    if y                   end
      w()
    end                      def check_y_z(val) ; z() if
val ; end
  end                        def check_y_w(val) ; w() if
val ; end
end
```

   A) Version 1 has higher per-method cyclomatic complexity

   B) Version 1 exposes more testing seams

   C) Version 1 has a lower ABC score

   D) Version 1 cannot be tested to 100% C2 coverage

6. Which statement is TRUE regarding refactoring?

   A) Refactoring improves test coverage

   B) During refactoring, you should never have a failing test

   C) Improving code structure is a primary goal

   D) Refactoring always reduces the amount of code

7. In method-level refactoring, the ____ code smell is likely to be present if any of the other three are present.

   A) long method

B) method does more than 1 thing
C) method has too many arguments
D) method jumps back and forth between levels of abstraction

8. Which expression statement regarding Design Reviews and Meetings is FALSE?
    A) Intended to improve the quality of the software product using the wisdom of the attendees
    B) They result in technical information exchange and can be highly educational for junior people
    C) Design reviews can be beneficial to both presenters *and* attendees
    D) Serving food like Samosas is vital to success of a good meeting

9. Which of the following git commands are used to help track who changed what file and when?
    A) git list
    B) git manage
    C) git push
    D) git blame

10. How do you compare two revisions of a file, or your current file and a previous revision?
    A) git diff
    B) git compare
    C) git clone
    D) git checkout

11. Which statement is FALSE?
    A) Software that uses more design patterns isn't necessarily better.
    B) Well-designed software can evolve to the point where patterns become anti-patterns.
    C) Trying to apply design patterns too early can be just as bad as applying them too late.
    D) Most design patterns are specific to a particular subset of programming languages.

12. Which statement, if any, regarding P&D maintenance is FALSE?
    A) The cost of maintenance usually exceeds the cost of development in P&D
    B) The Agile equivalent to P&D change requests is user stories; equivalent of change request cost estimates is points; P&D releases are like iterations
    C) The Agile lifecycle is similar to the P&D maintenance lifecycle: enhancing working software product, collaborating with customer vs. negotiating by contract, continuously responding to change
    D) All of the above are true

13. The **single best predictor** that a software project is likely to come in excessively over budget or late schedule is:
    A) project's scope or size is very large
    B) project uses P&D methodology rather than Agile
    C) project uses Agile methodology rather than P&D
    D) project's testing/QA is done by a separate team rather than by the developers

14. Given the success rate of small software projects versus large software projects presented in class, what technique(s) that we have covered would give us our best chance at building a large project from many small projects?
    A) The software architecture developed during the design phase of a Plan-and-Document lifecycle
    B) The model-view-controller design pattern
    C) The Façade design pattern
    D) Following a Service-Oriented Architecture

15. Which is true about a class's observance of the Single Responsibility Principle (SRP)?
    A) In general, we would expect to see a correlation between poor cohesion score and poor SOFA metrics
    B) Low cohesion is a possible indicator of an opportunity to extract a class
    C) If a class respects SRP, its methods probably respect SOFA
    D) If a class's methods respect SOFA, the class probably respects SRP

16. OmniAuth defines a handful of RESTful endpoints your app must provide to handle authentication with a variety of third parties. To add a new auth provider, you create a gem that works with that provider. Which statement is FALSE about OmniAuth?
    A) OmniAuth is itself compliant with OCP
    B) Using OmniAuth helps your app follow OCP (with respect to 3rd-party authentication)
    C) OmniAuth is an example of the Template pattern
    D) OmniAuth is an example of the Strategy pattern

17. The Inappropriate Intimacy design smell, which sometimes manifests as a Mock Trainwreck in unit tests, generally signals a violation of which of the following SOLID principles:
    A) Single Responsibility
    B) Open/Closed
    C) Liskov Substitution
    D) Injection of Dependencies
    E) Demeter

18. You want to create families of related objects to be used interchangeably to configure your application. Which design pattern is most appropriate to use?

    A) Abstract Factory Pattern
    B) Composite Pattern
    C) Observer Pattern
    D) Template Pattern

19. According to the Open/Closed Principle, a ____ should be open for ____ but closed against ____.

    A) class; extension; modification
    B) method; modification; polymorphism
    C) class; delegation; polymorphism
    D) method; stubbing; overriding

20. Which statements are TRUE regarding a function in JavaScript? Check ALL that apply.

    A) It can be anonymous
    B) It is a first-class object in the language
    C) It can execute concurrently with other functions
    D) It can be the value of a property (slot) in a JavaScript object
    E) When called with no arguments, parentheses are optional (as with Ruby functions)

21. Under what circumstances is it reasonable to delegate all responsibility for validating form inputs (for example, to ensure fields are not left blank) to client-side JavaScript? Choose ONE answer.

    A) If we can confirm that the user's browser has JavaScript enabled
    B) If we can confirm that the user's browser has JavaScript enabled, *and* the form is submitted over a secure connection
    C) Neither: the server must always perform such validations, even if there is already JavaScript client-side code that performs them

22. The ability to perform a background request and update the HTML page in-place with the response relies on (choose ONE answer):

    A) the browser having an embedded JavaScript interpreter
    B) the browser making the DOM available to JavaScript
    C) A JavaScript binding for XmlHttpRequest
    D) XML parsing in the browser
    E) JSON parsing in the browser