Name: _____

CSCI 3508 – Introduction to Software Engineering
Spring 2020 – Dr. Williams
Midterm – Due Wednesday, March 18, 2020

This is a take home test. Please submit your results in pdf format on Canvas.

Multiple choice

Please circle the best answer (a – d) to the following questions. (Note that where multiple answers are possible, the question will so stipulate.)

1. Software is:

   a. Instructions (computer programs) that when executed provided desired features, functions, and performance

   b. Data structures that enable the programs to adequately manipulate information

   c. Descriptive information in both hard copy and virtual forms that describes the operation and use of programs

   d. All the above

2. Software doesn't wear out. But it does deteriorate.

   a. False b. True

3. Legacy software systems were developed decade ago and have been continually modified to meet changes in business requirements and computing platforms. Why are legacy systems subject to such continuous change? (Circle all that apply.)

   a. The software must be adapted to meet the needs of new computing environments or technology.

   b. The software must be enhanced to implement new business requirements.

   c. The software must be extended to make it interoperate with other more modern systems or databases.

   d. The software must be re-architected to make it viable within an evolving computing environment.

4. _____ encompasses an infrastructure or ecosystem that enables any user, anywhere, to use a computing device to share computing resources on a broad scale.

   a. Cloud computing b. Mobile apps

   c. Graphical user interfaces d. Software

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5. _____ is the application of a systemic, disciplines, quantifiable approach to the development, operation, and maintenance of software

a. Software engineering b. Systems engineering

c. Software architecture d. Project management

7. A/an _____ focuses on a small, but well-defined objective (e.g., conducting a unit test) that produced a tangible outcome.

a. process b. activity

c. action d. task

7. A/an _____ is a collection of activities, actions, and tasks that are performed when some work product is being created.

a. process b. activity

c. action d. task

8. A/an _____ (e.g., architectural design) encompasses a set of tasks that produce a major work product (e.g., an architectural model).

a. process b. activity

c. action d. task

9. A/an _____ strives to achieve a broad objective (e.g., communication with stakeholders) and is applied regardless of the application domain, size of the project, complexity of the effort, or degree of rigor with which software engineering is applied.

a. process b. activity

c. action d. task

10. _____ is when software process and umbrella activities are adapted to the specific need of an organization and project to which they are applied.

a. Tailoring c. Configuration management

c. Instantiation d. Process management

11. A/an _____ is a temporary endeavor undertaken to create a unique product or service.

a. project b. activity

c. procedure d. task

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12. _____ is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements.

    a. project management
    b. software development
    c. software architecture
    d. process management

13. Implementation (i.e., Code and Unit Test) takes approximately what percentage of the effort in a typical software development project?

    a. 40-50%
    b. 30-40%
    c. 5-10%
    d. 15-20%

14. _____ is a quantitative analysis of project progress where the total hours to do the whole project are estimated and every task given an earned value based on its estimated percentage to the total.

    a. Resource allocation
    b. Budgeting
    c. Earned value management
    d. Risk assessment

15. The _____ is comprised of the cumulative to date actual cost of work performed plus the estimate to complete the remaining work.

    a. Budget at Completion (BAC)
    b. Schedule Performance Index (SPI)
    c. Estimate at Completion (EAC)
    d. Cost Performance Index (CPI)

16. The _____ is the effort planned for work tasks completed at a given point.

    a. Budgeted cost of work scheduled (BCWS)
    b. Budgeted cost of work performed (BCWP)
    c. Budget at Completion (BAC)
    d. Actual cost of work performed (ACWP)

17. The _____ is the effort planned for work tasks have been completed at a given point.

    a. Budgeted cost of work scheduled (BCWS)
    b. Budgeted cost of work performed (BCWP)
    c. Budget at Completion (BAC)
    d. Actual cost of work performed (ACWP)

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18. The _____ is the effort planned for work tasks scheduled to be completed at a given point.

    a. Budgeted cost of work scheduled (BCWS)

    b. Budgeted cost of work performed (BCWP)

    c. Budget at Completion (BAC)

    d. Actual cost of work performed (ACWP)

19. A/an _____ is a potential problem in the execution of a project – it might occur, or it might not.

    a. milestone b. fault

    c. event d. risk

20. Risks have the following characteristic(s)

    a. Uncertainty – a risk may or may not occur

    b. Loss – if the risk happens, unwanted consequences or losses <u>will</u> occur

    c. Both a and b

    d. None of the above

21. A requirement must accurately describe the functionality to be delivered.

    a. False b. True

22. It must be possible to implement each requirement within the known capabilities and limitations of the system and its environment.

    a. False b. True

23. A requirement may document an optional feature that the customer might want.

    a. False b. True

24. The reader of a requirement statement should be able to draw multiple interpretations of it.

    a. False b. True

25. You may or may not be able to devise tests or use other verification approaches, such as inspection or demonstration, to determine whether each requirement is properly implemented.

    a. False b. True

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26. A/an _____ should focus on requirements that are visible within the problem or business domain.

a. test plan
b. model
c. design
d. risk

27. A/an _____ is a scenario that describes a "thread of usage" for a system.

a. context
b. model
c. use case
d. architecture

28. _____ considers data and the processes that transform the data as separate entities.

a. structured analysis
b. traceability
c. use case analysis
d. object-oriented analysis

29. List the four items in the Agile Manifesto.

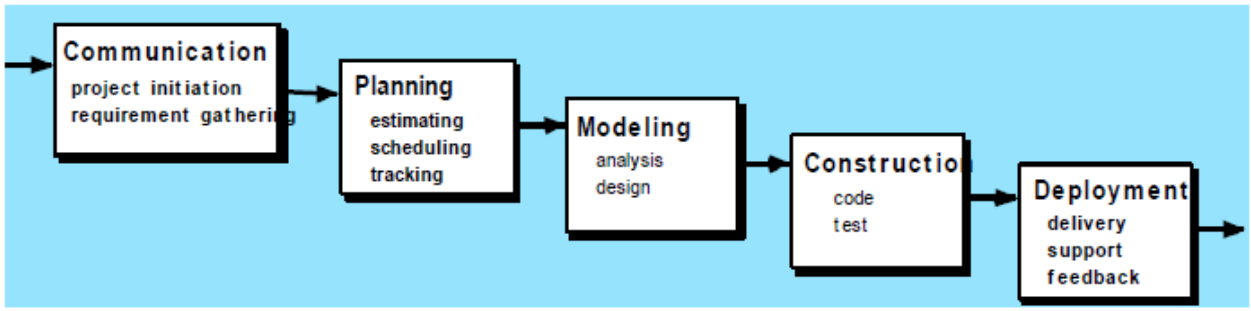
a. _____

b. _____

c. _____

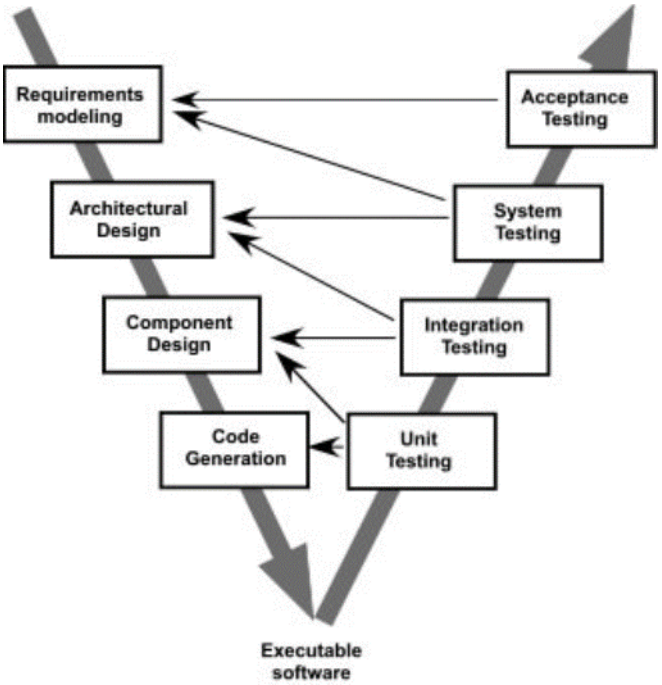
d. _____

30. Give the accepted named for each of the following process models:

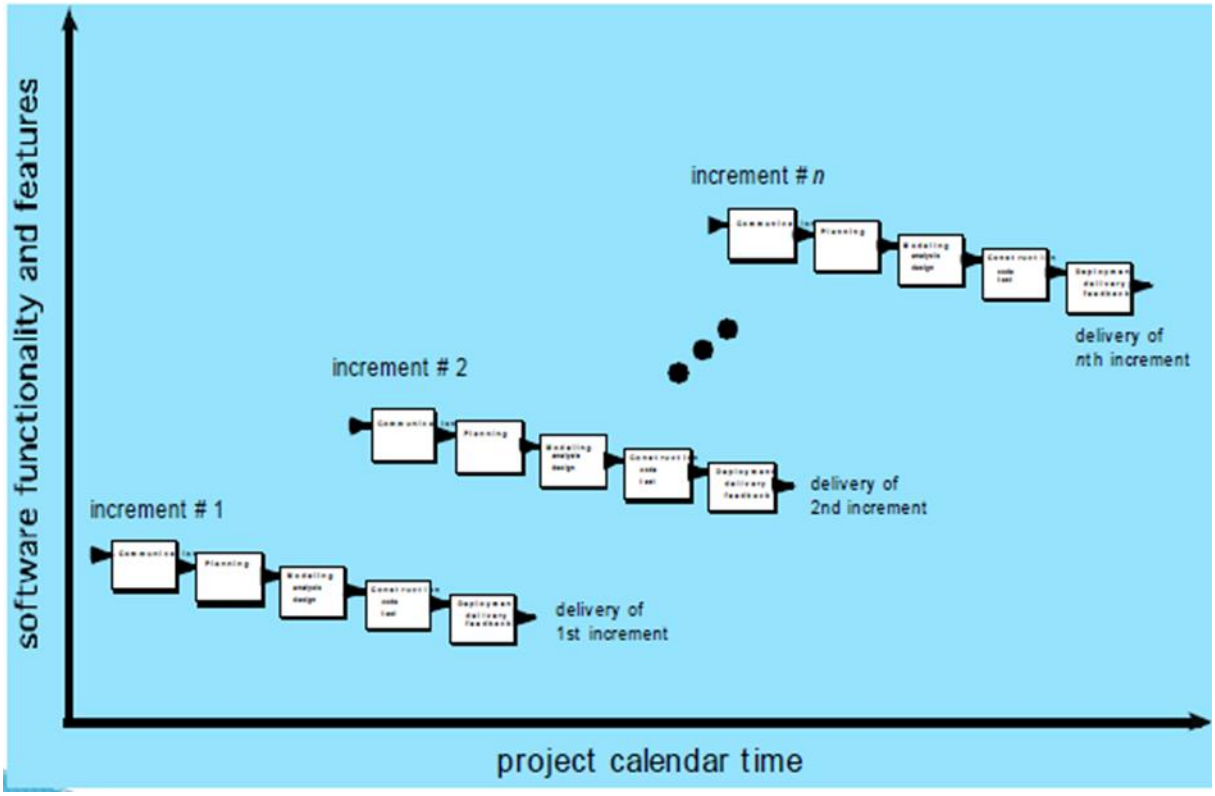


a. _____

Name: _____


Requirements modeling
Acceptance Testing
Architectural Design
System Testing
Component Design
Integration Testing
Code Generation
Unit Testing
Executable software

b. _____


software functionality and features
increment # n
delivery of nth increment
increment # 2
delivery of 2nd increment
increment # 1
delivery of 1st increment
project calendar time

c. _____

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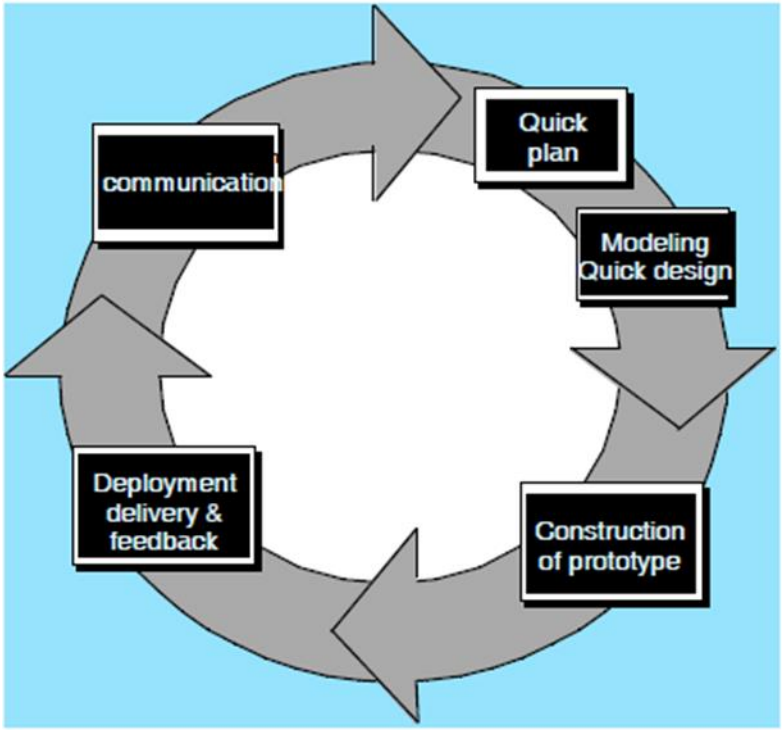
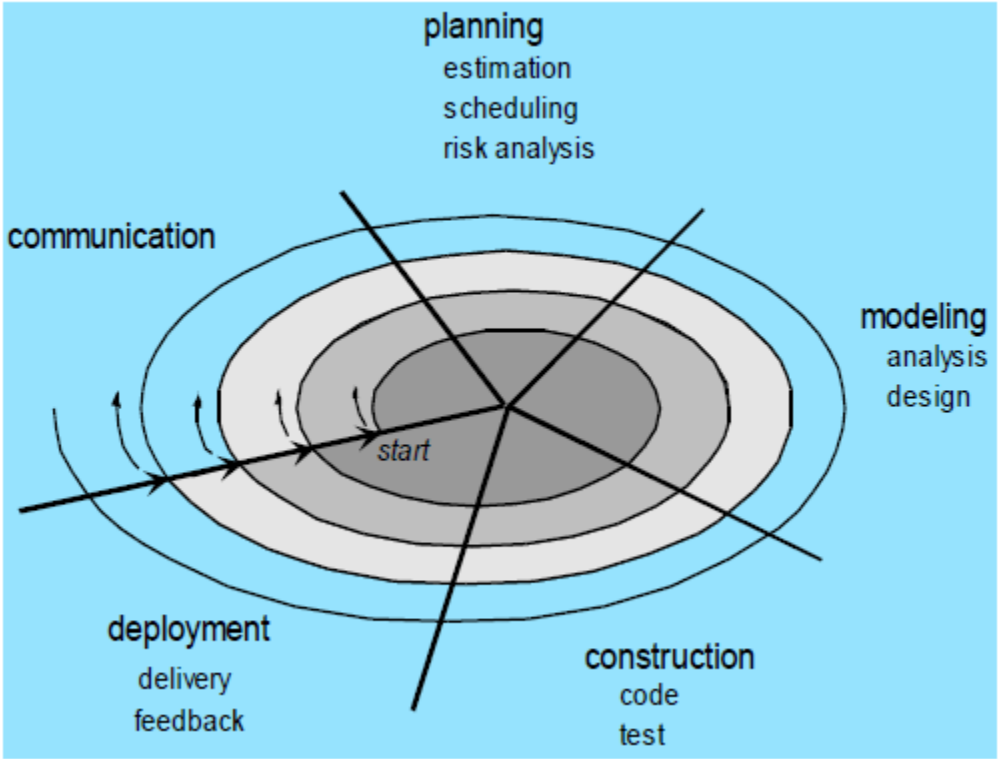

communication
Quick plan
Modeling Quick design
Construction of prototype
Deployment delivery & feedback

d. _____


planning
estimation
scheduling
risk analysis
communication
modeling
analysis
design
start
deployment
delivery
feedback
construction
code
test

e. _____

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Requirements Development and Management

Project R has gathered requirements metrics for the past 15 months. Requirements Development occurred during the first two months and resulted in a baselined number of requirements of 50. For the remainder of the project, requirements were added, changed, or removed per the following table. Note that the cumulative metrics include changes from the time requirements are baselined (after month two) to the month for the row.

#	Removed	Added	Changed	Total	Churn	Creep
1		30		30	--	--
2		20		50	--	--
3		5	5	55		
4	2	1	2	54		
5		4	6	58		
6	4		2	54		
7		2	5	56		
8	3	1	2	54		
9				54		
10		6	1	60		
11				60		
12	1		4	59		
13	2	4		61		
14				61		
15			2	61		

Requirements churn is a measure of changes, including additions and deletions, to the requirements after they are initially agreed to (i.e., baselined). One metric for requirements churn is the ratio of the number of baselined requirements minus the total number of changes to the number of baselined requirements.

$$Churn = \frac{R_B-(R_A+R_D+R_C)}{R_B},$$

where R_B is the number of baselined requirements, R_A is the number of additions to the requirements after they were baselined, R_D is the number of deletions to the requirements after they were baselined, and R_C is the number of changed requirements after they were baselined.

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31. What is the minimum value for this churn metric?

_____

32. What is the maximum value for this churn metric?

_____

33. What is the "ideal" value for this churn metric?

_____

34. Populate the churn column in the matrix with the cumulative churn metric for each month after the requirements were baselined for Project R.

[The answers are to be placed in the table above.]

Requirements creep is defined as the addition to the requirements after they are agreed to (i.e., baselined). One metric for requirements creep is the ratio of the number of baselined requirements plus the additions after the requirements were baselined to the number of baselined requirements.

$creep = \frac{R_B - R_A}{R_B}$.

35. What is the minimum value of this creep metric?

_____

36. What is the maximum value of this creep metric?

_____

37. What is the "ideal" value for this metric?

_____

38. Populate the creep column in the matrix with the cumulative creep matrix for each month after the requirements were baselined for Project R.

[The answers are to be placed in the table above.]

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Earned Value Management

Project E has 60 planned tasks estimated to take 12 months and 1000 person-days to complete. After 3 months, 12 tasks were scheduled to be completed, but 15 tasks have finished.

Task	Planned Effort	Actual Effort
1	12.5	14.5
2	11.0	16.0
3	17.0	30.0
4	9.5	12.0
5	9.0	15.0
6	19.0	32.0
7	10.0	24.0
8	4.5	9.0
9	10.0	12.0
10	6.5	8.0
11	4.0	5.0
12	14.5	14.0
13	15.0	18.0
14	7.5	9.0
15	6.0	8.0
…	…	…

39. Compute the following EVM metrics.

a. Budget at Completion (BAC)

_____

b. Budgeted Cost of Work Scheduled (BCWS)

_____

c. Budgeted Cost of Work Performed (BCWP)

_____

d. Actual Cost of Work Performed (ACWP)

_____

e. Schedule Performance Index (SPI)

_____

f. Schedule Variance (SV)

_____

Name: _____

g. Percent scheduled for completion (%SC)

_____

h. Percent complete (%C)

_____

40. Is Project E currently behind schedule, on schedule, or ahead of schedule based of these EVM metrics? [Consider a project to be behind or ahead of schedule if there is greater than 5% deviance from the plan.]

a. Behind schedule b. On schedule c. Ahead of schedule

41. Compute the following EVM metrics.

a. Cost Performance Index (CPI)

_____

b. Cost Variance (CV)

_____

42. In terms of cost, is the project is under budget, on budget, or over budget? [Consider a project to be behind or ahead of budget if there is greater than 5% deviance from the plan.]

a. Under budget b. On budget c. Over Budget

43. If the organization performing this work requires replanning when schedule or cost metrics have more than 10% variance from the planned values, would this project require replanning?

a. True b. False

44. Would the replanning, if any, require schedule changes?

a. True b. False

45 Would the replanning, if any, require budget (cost) changes?

a. True b. False