



King Saud University

College of Computer and Information Sciences

Computer Science Department

	Course Code:			CSC 342
	Course Title:			Software Engineering
	Semester:			Solution Fall 2016
	Exercises Cover Sheet:		Final Exam	3 hours
Student Name:			
Student ID:			
Department Name:			

Tick the Relevant	Computer Science B.Sc. Program ABET Student Outcomes	NCAAA Outcomes	Question No. Relevant Is Hyperlinked	Covering %
	a) Apply knowledge of computing and mathematics appropriate to the discipline;	1.1	----	----
√	b) Analyze a problem, and identify and define the computing requirements appropriate to its solution	2.1	Ex. 1	25%
√	c) Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;	2.2	Ex. 4	25%
√	d) Function effectively on teams to accomplish a common goal;	3.1	----	----
√	e) Understanding of professional, ethical, legal, security, and social issues and responsibilities;	1.2 – 3.2	----	----
	f) Communicate effectively with a range of audiences;	4.1	----	----
	g) Analyze the local and global impact of computing on individuals, organizations and society;	2.3	----	----
	h) Recognition of the need for, and an ability to engage in, continuing professional development;	2.4	----	---
√	i) Use current techniques, skills, and tools necessary for computing practices.	1.3	Ex. 3	12.5%
	j) Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;	1.4	----	----
√	k) Apply design and development principles in the construction of software systems of varying complexity;	1.5	Ex. 2	37.5%

This exam comprises 5 exercises. Make sure you read each exercise carefully before attempting an answer. Be sure to clearly indicate your final answer for each exercise. Also, be sure to state any assumptions that you are making in your answers.

Good luck!

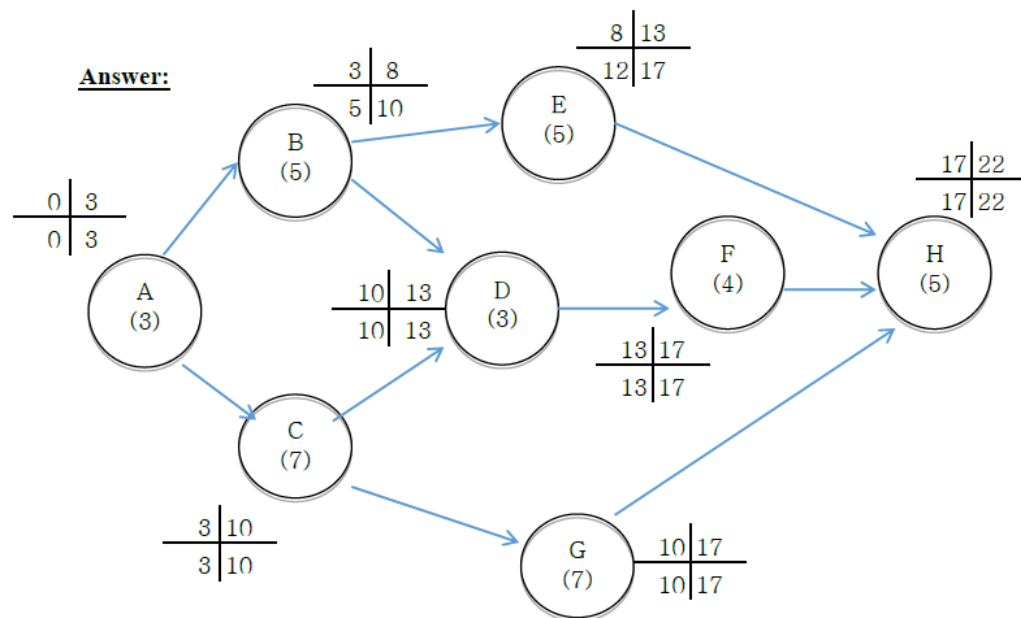
Exercise 1: (10 marks)

Consider a project with the following activities. Times are given in weeks.

Activity	Preceding	Time (week)
A	--	3
B	A	5
C	A	7
D	B, C	3
E	B	5
F	D	4
G	C	7
H	E, F, G	5

1. Draw the network activity diagram and find the earliest and the latest start/finish time for each activity?
2. If activity E is delayed by 5 weeks, will the project completion time be affected? Justify your answer.
3. If activity F is delayed by 5 weeks, will the project completion time be affected? Justify your answer.
4. Identify critical path(s).

Answer:



1. Yes, the project will be delayed. The slack of activity E is 4, and it can be delayed by 4 weeks without affecting the project. If it delays by more than 4 weeks the project will be delayed.
2. Yes, the project will be delayed. Activity F is part of the critical path, and any delays in activity F will affect the project.
3. There are 2 critical paths: A-C-D-F-H; A-C-G-H

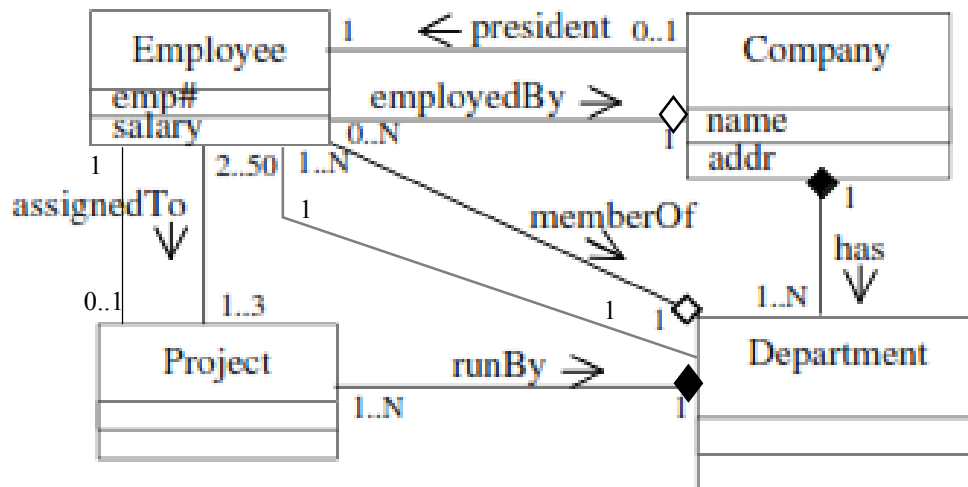
Exercise 2: (15 marks)

Description:

Consider the world of companies: Companies employ employees (who can only work for one company), and consist of one or more departments. Each company has a single president, who is an employee. Departments have employees as members and run projects (one or more.). Each Department has one employee as a head. Employees can work in 1 to 3 projects, while a project can have 2 to 50 assigned employees and one manager who is an employee. You may assume that companies have a name and address, while employees have an employee# and a salary.

Draw a class diagram for the description above. Make sure to show attributes, multiplicities and aggregation associations, where appropriate. No need to show any operations.

Answer:

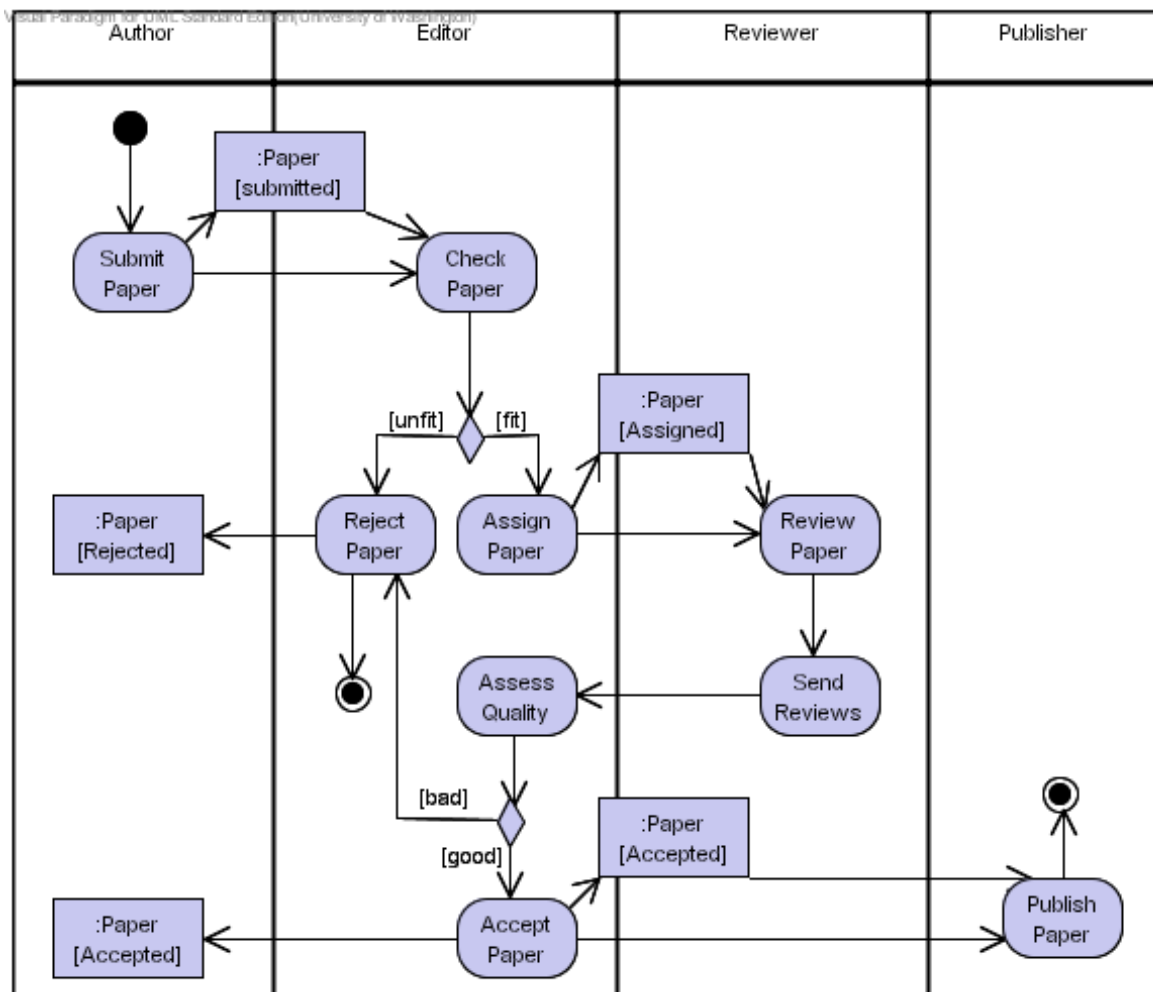


Exercise 3: (5 marks)

Construct an activity diagram with **swimlane** for the following scenario which describes the business process to publish an academic paper:

- The author submits a paper to an editor of a conference.
- The editor first checks if the paper fit the topic of the conference. If not, the editor rejects the paper. Otherwise, the editor assigns the paper to a number of reviewers.
- The reviewers review the paper, and write a review. The review is sent to the editor.
- The editor then assesses the quality of the paper with the help of reviewers' comments. If the quality is bad, the editor rejects the paper. If the quality is good, the editor sends an acceptance letter to the author and sends the paper to the publisher for publication.
- The publisher publishes the paper.

Answer:

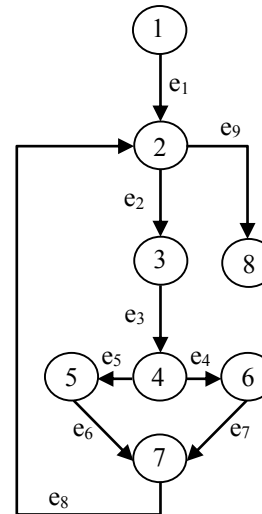


Exercise 4: (10 marks)

Given the following sorting algorithm:

```
public void howComplex() {
    int i=20;
    while (i<10) {
        System.out.printf("i is %d",i);
        if (i%2 == 0) {
            System.out.println("Even");
        } else {
            System.out.println("Odd");
        }
    }
}
```

Given the following flow graph of the previous algorithm:



1. Determine the cyclomatic complexity of the flow graph.

Answer: ...9 - 8 + 2 = 3...

2. Determine the basis set of independent paths.

Answer:

- 1 - 2 - 8
- 1 - 2 - 3 - 4 - 5 - 7 - 2 - 8
- 1 - 2 - 3 - 4 - 6 - 7 - 2 - 8

3. Put a cross (X) in the relevant box:

	Black-Box Testing	White-Box testing	Validation Testing	Defect Testing
Path Testing	X			X
Partition Testing	X			X
Requirements Testing	X		X	
Structural Testing		X	X	

		Result				
Question No.	Relevant ABET Student Outcome	Relevant NCAAA Student Outcome	SO is Covered by %	Full Mark	Student Mark	Assessor's Feedback
Ex. 1	b	2.1	27.5 %	10		
Ex. 2	k	1.5	35.0%	15		
Ex. 3	i	1.3	12.5%	5		
Ex. 4	c	2.2	25.0%	10		
Totals			100%	40		
		I certify that the work contained within this assignment is all my own work and referenced where required.				Feedback Received:
		<div style="display: flex; justify-content: space-between;"> <div>Student Signature:</div> <div>Date:</div> </div>				
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