King Saud University

College of Computer and Information Sciences
Computer Science Department

Course Code:	**CSC 342**
Course Title:	**Software Engineering**
Semester:	**Fall 2017**
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. 4-5	**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. 2-3	**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 points)*

Imagine that you are analyzing requirements for an online forum system. Forums can get very complex, but imagine that we have only two kinds of users that interact with our system with different responsibilities: Regular Users and Administrators. Both can log in to the system, and part of logging in is an internal authentication process. Both can also register with the system, which also uses internal authentication. After logging in, everybody can post new messages to the board, however only Administrators can check statistics and create new threads. Regular users on the other hand can send private messages to other users, while administrators do not have this ability.
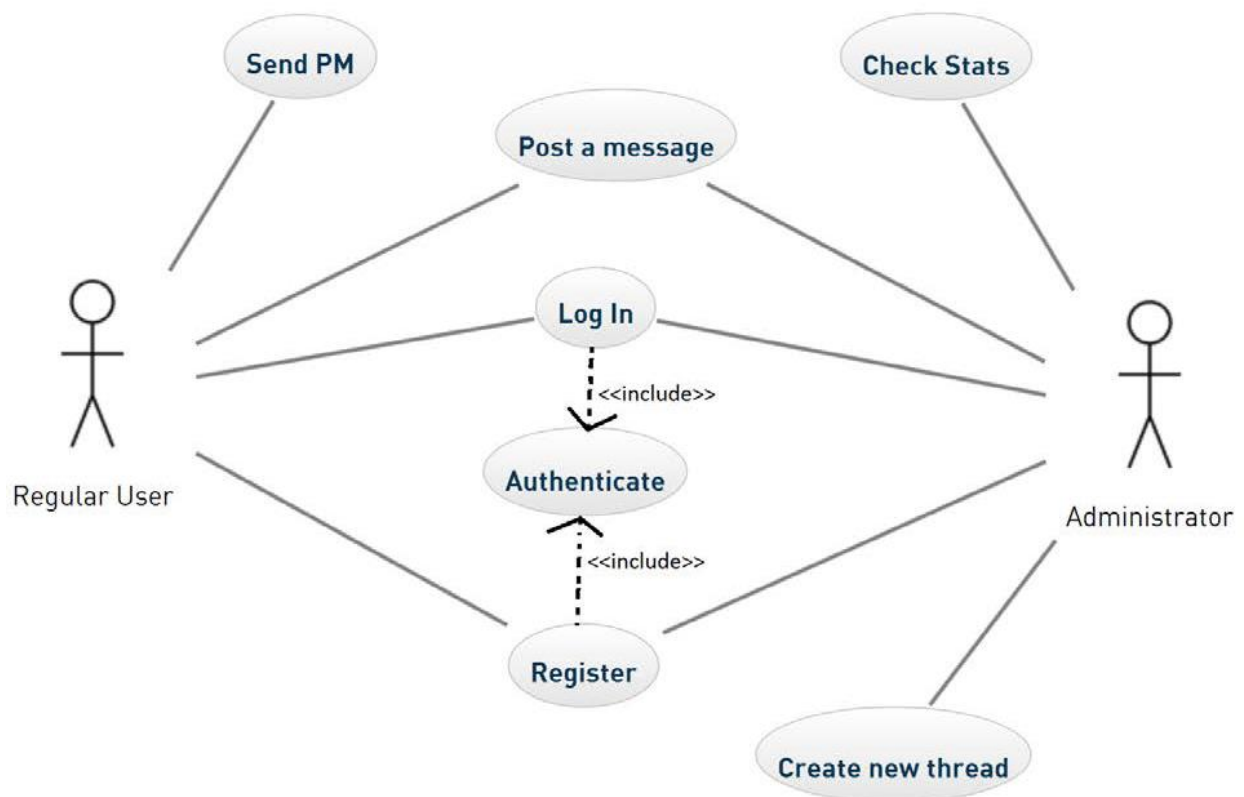
Draw a Use Case diagram that contains Actors, Use Cases and their relationship from the scenario described above.
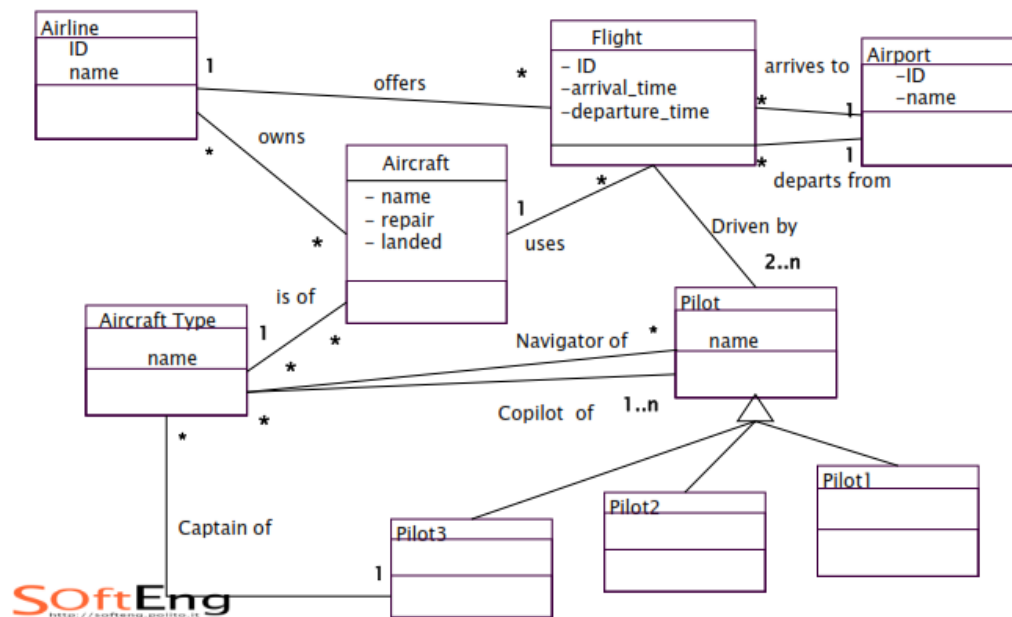
Exercise 2: *(8 points)*

Consider the airline management system. Many flights land and depart from city's airport. Each city may have more than one airports. Each flight has a departure airport and an arrival airport. Each flight has a pilot and a co-pilot, and it uses an aircraft of a certain type. An airline owns a set of aircrafts of different types. A type of aircraft may need a particular number of pilots, with a different role (Ex. captain, co-pilot, and navigator): there must be at least one captain and one co-pilot.

Draw a class diagram to model the system. You should use different elements of class diagrams such as classes, aggregation, composition, multiplicity, and inheritance.

Answer:

Construct an activity diagram with Swimlane for the following scenario.

This describes the business process to publish an academic paper:
- The author submits a paper to an editor of a journal.
- The editor first checks if the paper fit the theme of the journal. 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 paper will be accepted, the author notified and the paper is forwarded to the publisher for publication.
- The publisher publishes the paper.
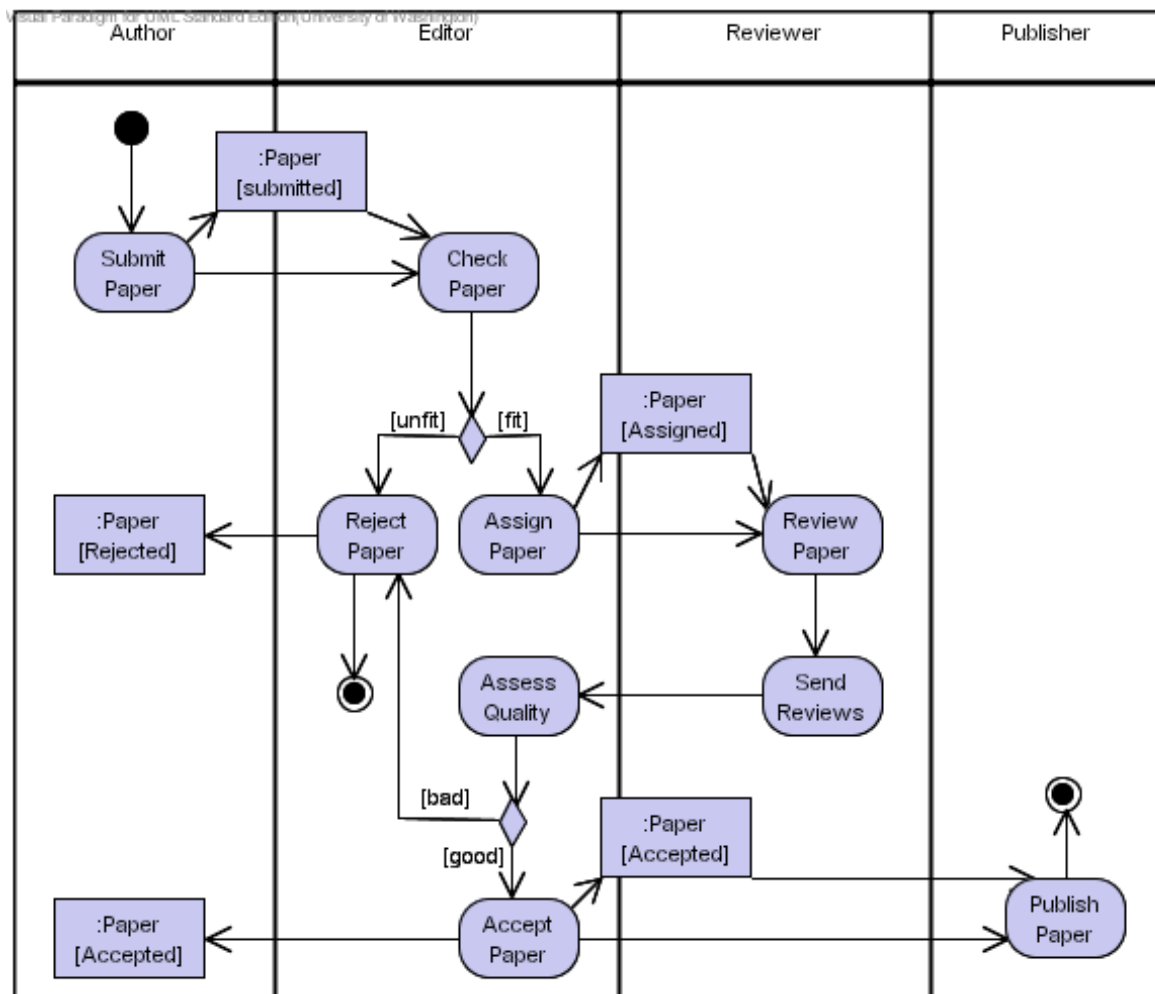
Exercise 4: *(5 points)*

Given the following sorting algorithm, it uses an array `A` of *n* integers `A[1]`, `A[2]`, ..., `A[n]` as input, and returns the same array output, with its contents rearranged in sorted (increasing) order.

On occasion a final statement labeled `S8` (stop) will be used to identify the program's exit point.
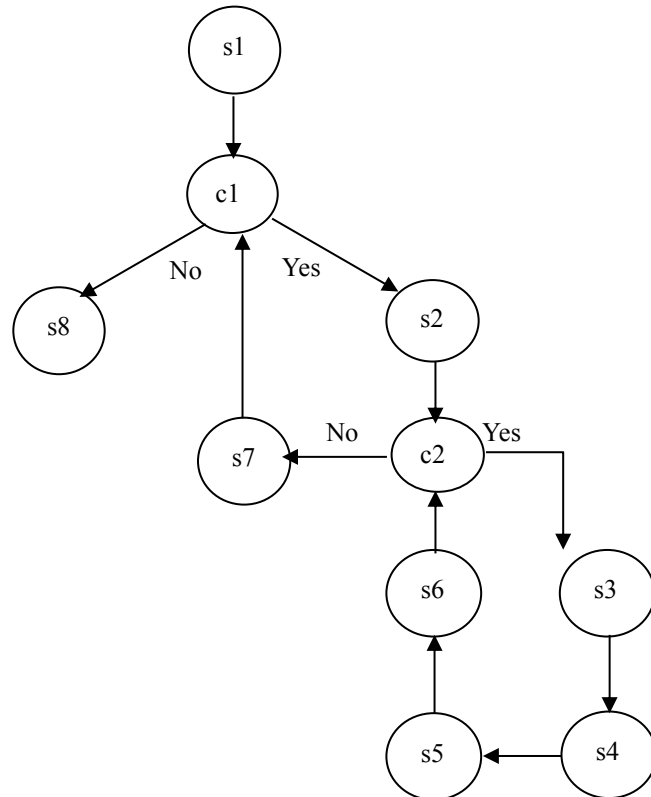
1. Determine the cyclomatic complexity of the flow graph.

    11-10+2= 3

2. Determine the basis set of independent paths.

    s1 c1 s8

    s1 c1 s2 c2 s7 c1 s8

    s1 c1 s2 c2 s3 s4 s5 s6 s2 c2 s7 c1 s8

Exercise 5: *(5 points)*

1. Mark T (True) or F (False):
   a) In white-box testing, the tester does not have the source code
   b) Black box testing is based on the system specification
   c) The objective of equivalence partitioning is to increase the number of test cases
   d) Cyclomatic complexity equals the number of independent paths the program
   e) Path testing is a black box testing

Answer:

a	b	c	d	e
F	T	F	T	F

Question No.	Relevant ABET Student Outcome	Relevant NCAAA Student Outcome	SO is Covered by %	Full Mark	Student Mark	Assessor's Feedback
			Result			
Ex. 1	b	2.1	25%	10		
Ex. 2	k	1.5	37.5%	15		
Ex. 3						
Ex. 3	i	1.3	12.5%	5		
Ex. 4	c	2.2	25%	10		
Ex. 5						
Totals			**100%**	**40**		

I certify that the work contained within this assignment is all my own work and referenced where required. Student Signature: Date:	Feedback Received: Student Signature: Date: