Exercise 1: *(Process Model)* *(4 points)*

Match each lifecycle model with its definition, by drawing a line connecting them.

incremental delivery		assess risks at each step; do most critical action first
Waterfall		build an initial small requirement spec, code it, then "evolve" the spec and code as needed
spiral		build initial requirement specs for several releases, then design-and-code each in sequence
evolutionary prototyping		standard phases (requirements, design, code, test) in order

Exercise 2: *(Process Model)* *(7.5 points)*

For the five requirement statements below, indicate what type of requirement it is, Functional (F), or Non Functional (NF).

a. Customer can pay bill though ATM.
b. System Y shall process a minimum of 8 transactions per second.
c. The executable code of System Z shall be limited to 512Kbytes (Memory size of the system).
d. User can print document <u>easily</u>.
e. Allow user to change his picture.
f. The system shall be developed for PC and Macintosh platforms.
g. Student can add and remove courses.
h. The access permissions for system data may only be changed by the system's data administrator.
i. The system shall not operate if the external temperature is below 4 degrees Celsius.
j. Customer can transfer money throw the website of bank.

Answer:

a	b	c	d	e	f	g	h	i	j
...F...	.NF..	NF..	.NF..	...F...	.NF..	...F...	F.	.NF..	...F...

Exercise 3: *(Domain Model) (10.5 points)*

Draw a UML Class Diagram representing the following elements from the problem domain for digital books: An author is either a publishing house or an editor, where a publishing house consists of two or more editor. Each book has an author who wrote it, and an author who performed it. Therefore, each book is performed by exactly one author, and written by exactly one author. Each book contains many topics. A topic is composed of a number of chapters. Because the order of the chapters is important, the system will need to know, for any given chapter, what the next chapter is, and what the previous chapter is.

Draw a class diagram for this information, and be sure to label all the associations (relationships) with appropriate multiplicities.
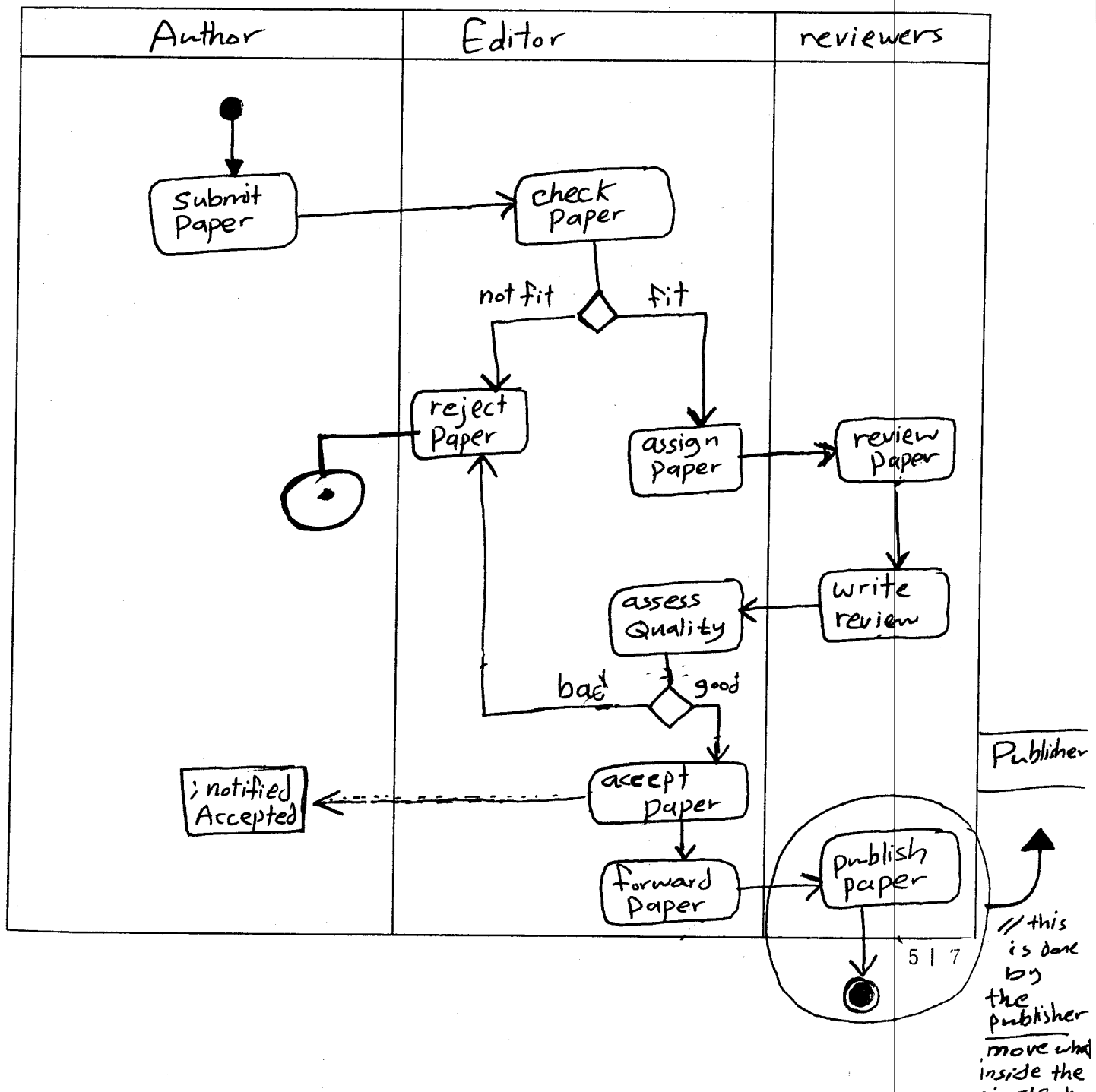
Answer:
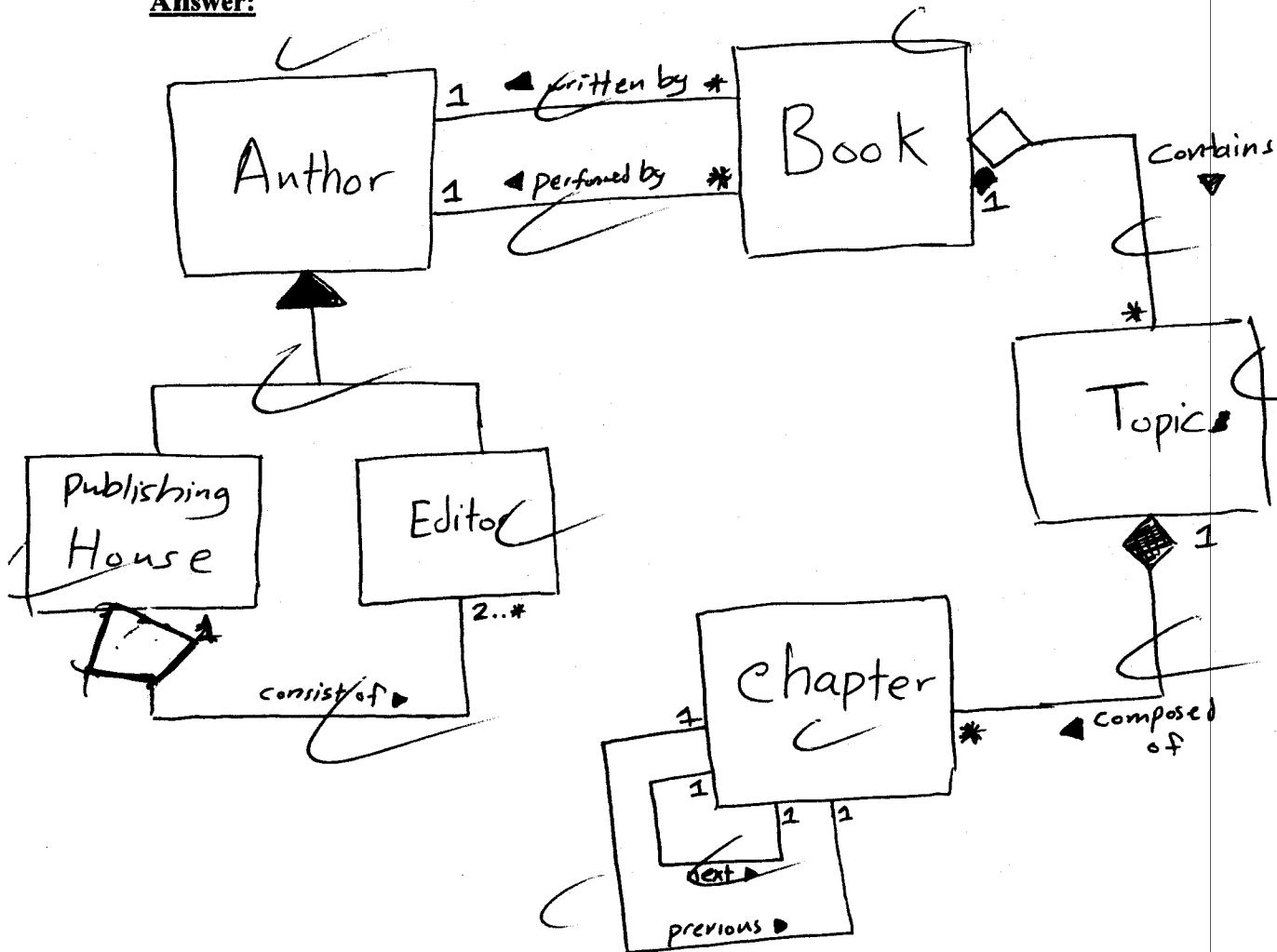
Exercise 5: *(Activity Diagram - Swimlane) (7.5 points)*

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.

Answer:

Author	Editor	reviewers

Submit Paper → check Paper

check Paper → (decision) → not fit / fit

not fit → reject Paper

reject Paper → (end)

fit → assign Paper → review Paper → write review → assess Quality

assess Quality → (decision) → bad / good

bad → reject Paper

good → accept paper → ; notified Accepted

accept paper → forward Paper → publish paper → (end)

Publisher

// this is done by the publisher
move what inside the

**Exercise 4:** *(Architectural Design)* *(3 points)*

1. High cohesion is desirable, and a highly cohesive subsystem has:
   - (a) Many dependencies among its components
   - b) A few dependencies among its components
   - c) Many dependencies on other subsystems
   - d) A few dependencies on other subsystems

2. Loose coupling is desirable, and a loosely coupled subsystem has:
   - a) Many dependencies among its components
   - b) A few dependencies among its components
   - c) Many dependencies on other subsystems
   - (d) A few dependencies on other subsystems

3. Which of the following statements is FALSE about cohesion and coupling:
   - a) Loose coupling results in sub-system independence
   - (b) Loose coupling makes modification and maintenance difficult
   - c) A highly cohesive subsystem contains strongly related objects
   - d) In a highly cohesive subsystem all elements are directed toward performing the same task

Answer:

1	2	3
a	d	b

Exercise 6: *(Testing)* *(4 points)*

Given the following flow graph of an algorithm:
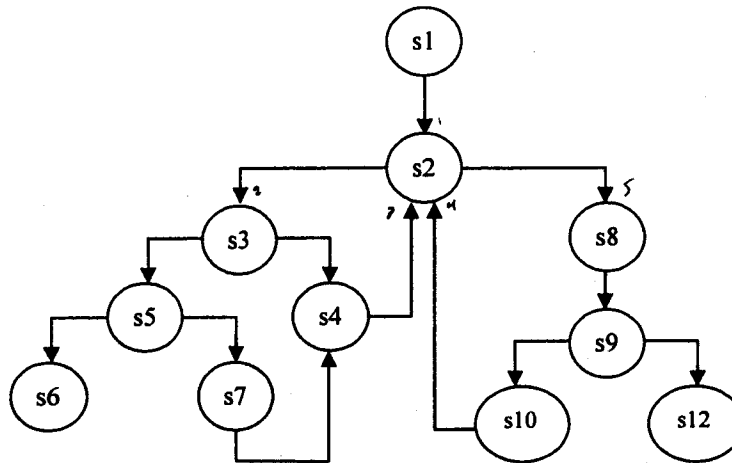
1. Determine the cyclomatic complexity of the flow graph.

.number..of..edges.....-...number..of..nodes.....+..2.....=.13-11+2

= $\boxed{4}$

2. Determine the basis set of independent paths.

1.-...S1.,..S2.,..S3.,..S5.,..S6.................................

2.-...S1.,..S2.,..S8.,..S9.,..S12....,...........................

3.-...S1.,..S2.,..S3.,..S5.,..S7.,.S4.,.S2.,..S8.,..S9.,..S.12.......

4.-...S1.,..S2.,..S3.,..S4.,.S2.,.S8.,.S9.,.S10.,.S2..,..S.8.,.S9.,.S12

Exercise 7: *(Testing)* *(3.5 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) Verification is dynamic testing (you need to run the code)
   f) A *successful test* is a test that shows no error in the program
   g) Path testing is a black box testing

Answer:

a	b	c	d	e	f	g
F	T	F	T	F	F	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	28.75 %	4		
Ex. 2				7.5		
Ex. 3	k	1.5	33.75%	10.5		
Ex. 4				3		
Ex. 5	i	1.3	18.75%	7.5		
Ex. 6	c	2.2	18.75%	4		
Ex. 7				3.5		
Totals			100%	4€		

I certify that the work contained within this assignment is all m own work and referenced where required.

Student Signature: Date:

Feedback Received:

Student Signature: Date: