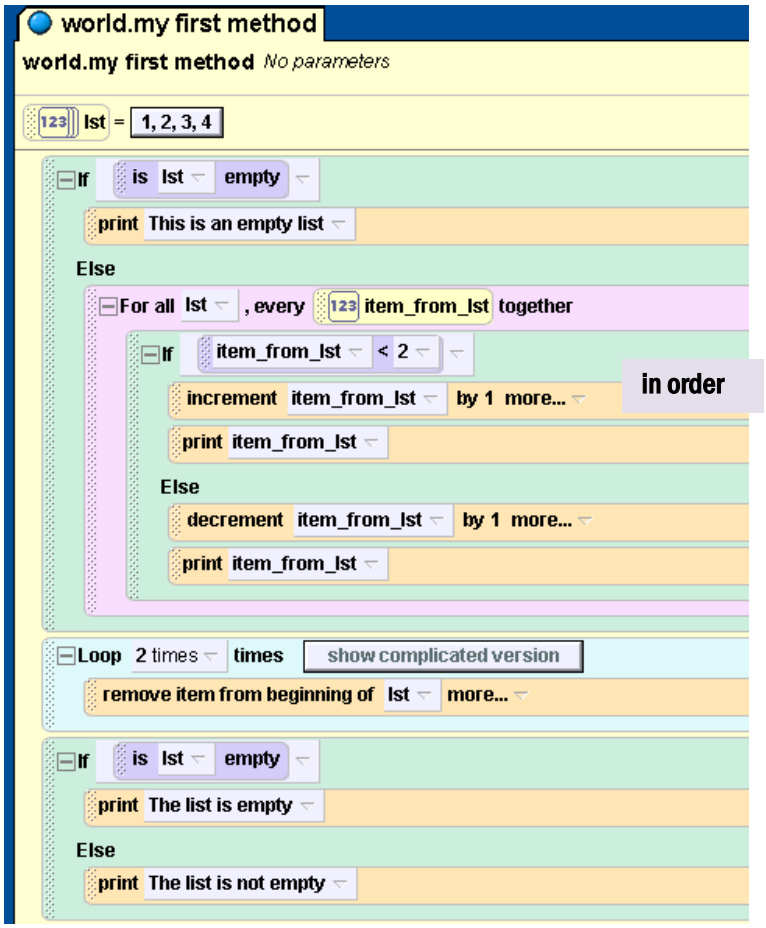
Final Exam Practice Questions – SAMPLE SOLUTIONS

Note: The final exam is comprehensive. However, the following questions only focus on post-midterm material.

Suggested questions from the textbook:

Chapter 2 – question 3
Chapter 4 – questions 2, 5, 7(except i), and 10
Chapter 5 – questions 8, 9, and 11

Question 1: What is the output of the following Alice program? Do not describe what the program does; simply indicate the result of each **print** statement.



Solution:
2
1
2
3
The list is not empty

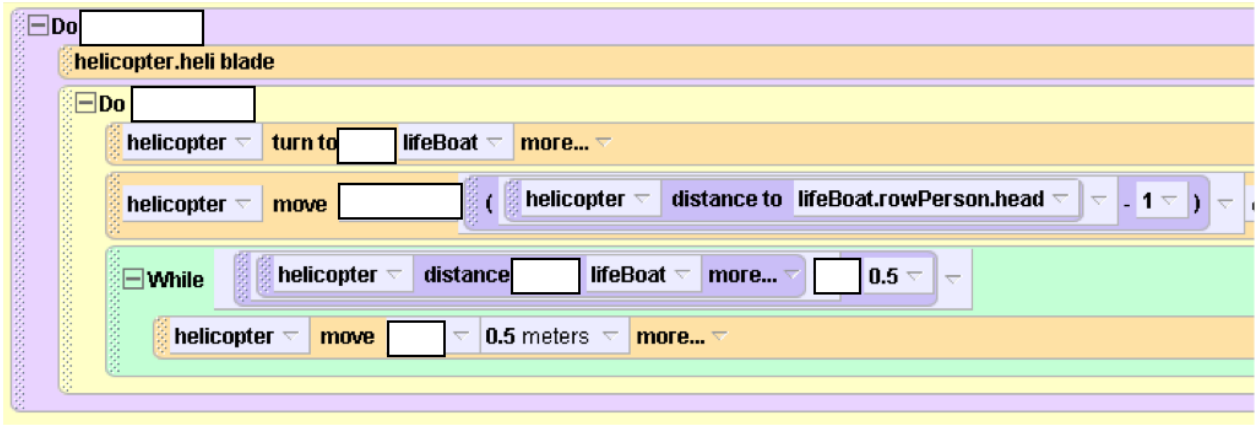
Question 2: We need your help to complete an Alice program that represents a rescuing mission, with a helicopter object and a boat object.

The program is supposed to carry out the following:

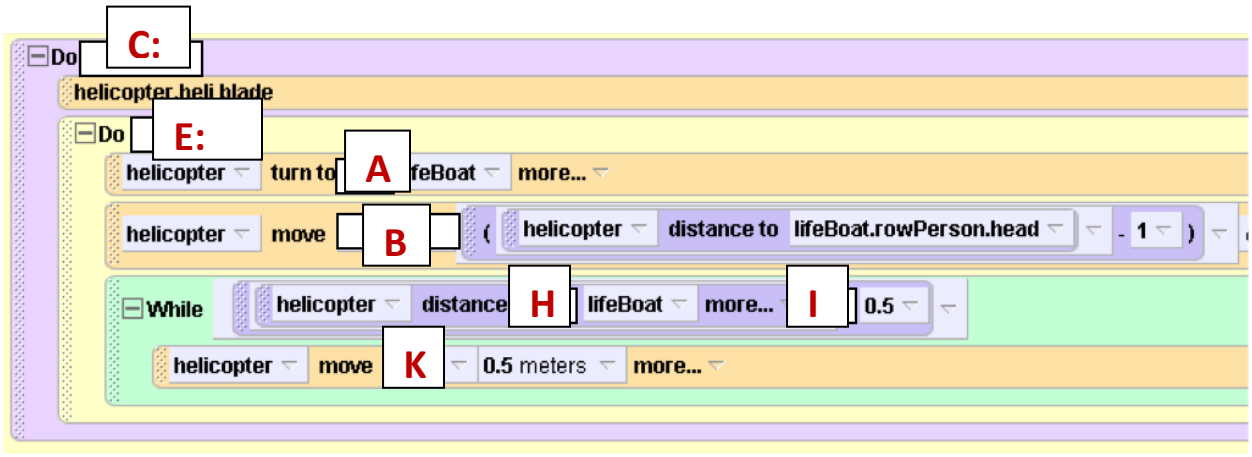
1. The blades of the helicopter are rotating all the time.
2. The helicopter turns to face the lifeboat, approaches it and hovers over it, dropping down until it gets close to it (0.5 meter above the lifeboat).
3. At each step of the downward movement the helicopter moves down by 0.5 meter.

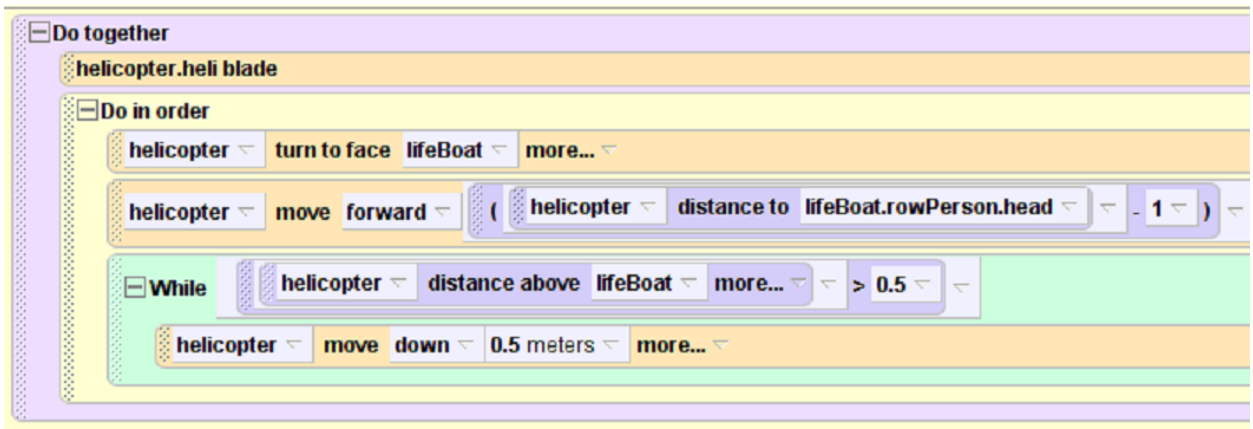
You will use the following to fill in the blanks in the program. To fill in the blanks, simply write the corresponding letter in the blanks:

A	face
B	forward
C	together
D	move
E	In order
F	rotate
G	below
H	above
I	>
J	<
K	down


Do
helicopter.heli blade
Do
helicopter
turn to
lifeBoat
more...
helicopter
move
(
helicopter
distance to
lifeBoat.rowPerson.head
-
1
)
While
helicopter
distance
lifeBoat
more...
0.5
helicopter
move
0.5 meters
more...

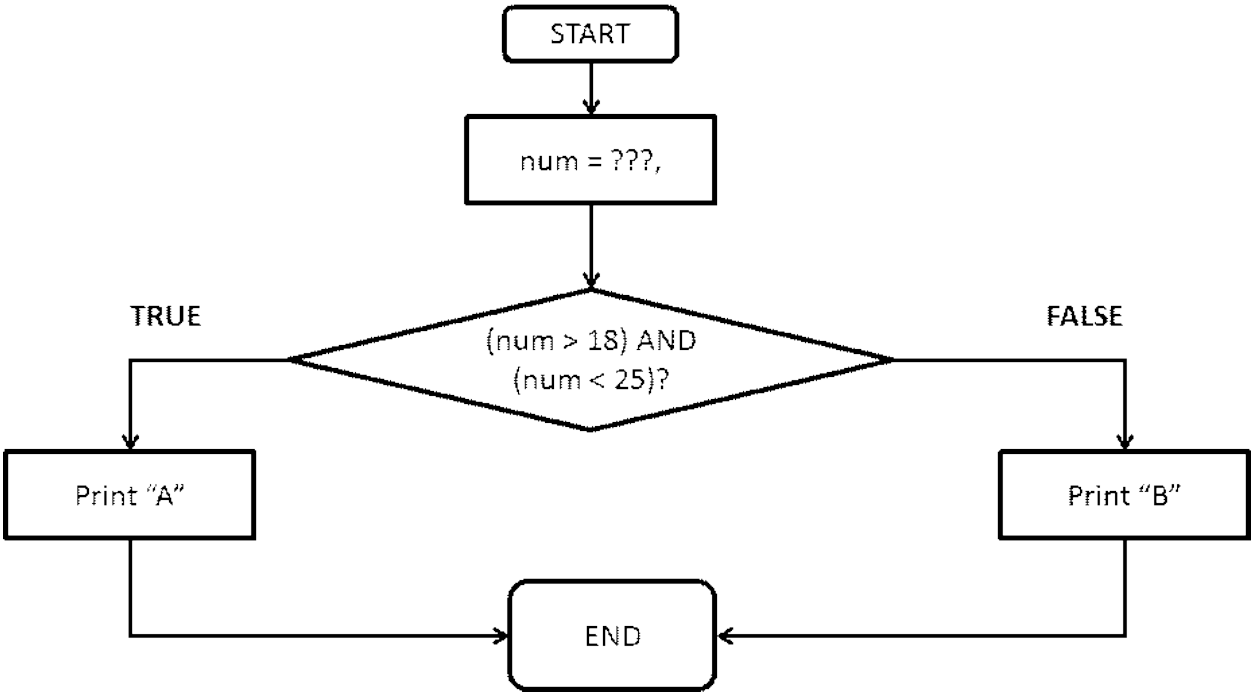
Solution:


C:
Do
helicopter.heli blade
E:
Do
helicopter
turn to
A
feBoat
more...
helicopter
move
B
(
helicopter
distance to
lifeBoat.rowPerson.head
-
1
)
While
helicopter
distance
H
lifeBoat
more...
I
0.5
helicopter
move
K
0.5 meters
more...


Do together
helicopter.heli blade
Do in order
helicopter
turn to face
lifeBoat
more...
helicopter
move
forward
(
helicopter
distance to
lifeBoat.rowPerson.head
-
1
)
While
helicopter
distance above
lifeBoat
more...
> 0.5
helicopter
move
down
0.5 meters
more...

Question 3

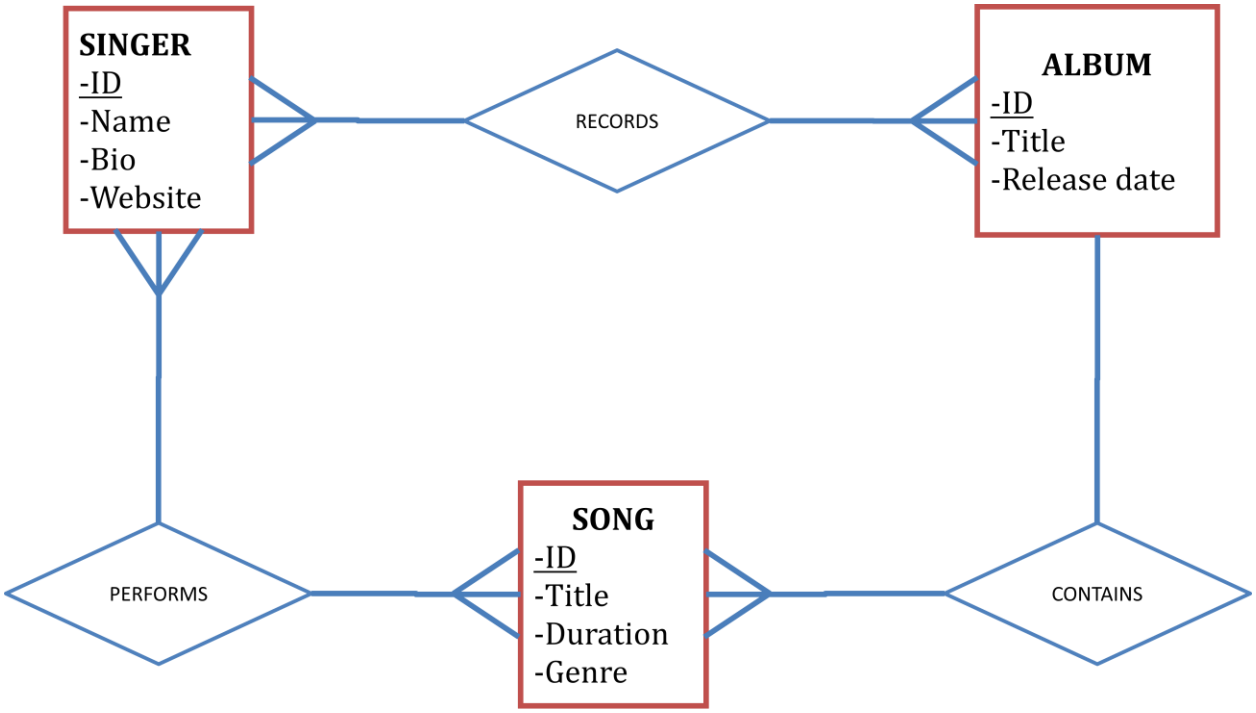
Given the values of 'num' specified in the table, you are to fill in the missing values of the table that describe the output printed with the following flowchart.



Value assigned to num	Output printed
17	B
25	B
19	A

Question 4:

Consider the following ERD.



a. Use Algorithm 4.2 starting on page 104 of your text to convert the above ERD to a database schema.

Solution:

SINGER

SingerID	**Name**	**Bio**	**Website**

ALBUM

AlbumID	**Title**	**ReleaseDate**

RECORDS

SingerID	**AlbumID**

SONG

SongID	**Title**	**Duration**	**Genre**	**AlbumID**

PERFORMS

SingerID	**SongID**

Write the following queries in SQL

b. Retrieve all album (titles) that were released before '1-Jan-2011'

```
SELECT Title
FROM ALBUM
WHERE ReleaseDate < '1-Jan-2011';
```

c. Retrieve the names and biography of all singers that have a website (a singer with no Website has the Website value in the database recorded as NULL. In SQL, this condition can be determined by asking if Website IS NOT NULL)

```
SELECT Name, Bio
FROM SINGER
WHERE Website IS NOT NULL;
```

d. Retrieve all songs whose duration is inclusively between 2 and 4 minutes, but whose genre is pop or rock and roll, but not country.

```
SELECT *
FROM SONG
WHERE Duration >= 2 AND Duration <= 4
AND (Genre IN ('rock and roll', 'pop');
```

e. Retrieve the song titles for all albums, ordered alphabetically by album title and for songs from the same album by song title.

```
SELECT ALBUM.Title, SONG.Title
FROM ALBUM, SONG
WHERE SONG.AlbumID = ALBUM.AlbumID
ORDER BY ALBUM.Title, SONG.Title;
```

f. Retrieve the average song duration for each singer. Your query can simply output the singer id and the average song duration for that singer. It is more challenging to output the singer **name** and the average song duration. Attempt formulating the latter (with the singer's name) only after successfully formulating and understanding the former (with the singer's id).

```
SELECT Name, AVG(Duration)
FROM SINGER, SONG, PERFORMS
WHERE SINGER.SingerID = PERFORMS.SingerID
AND SONG.SongID = PERFORMS.SongID
GROUP BY Name;
```