Paper 1 (Section A)

Question No.	Key	Question No.	Key
1.	C (71)	21.	D (74)
2.	C (83)	22.	D (60)
3.	A (32)	23.	B (73)
4.	B (56)	24.	B (69)
5.	D 68)	25.	D (76)
6.	A (55)	26.	D (47)
7.	C (97)	27.	A (87)
8.	A (44)	28.	B (67)
9.	D (37)	29.	C (68)
10.	B (89)	30.	A (73)
11.	A (74)	31.	D (58)
12.	B (82)	32.	C (81)
13.	A (73)	33.	D (69)
14.	A (92)	34.	D (83)
15.	C (57)	35.	C (98)
16.	A (70)	36.	B (71)
17.	C (91)	37.	C (73)
18.	D (80)	38.	A (53)
19.	A (70)	39.	C (83)
20.	B (84)	40.	B (62)

Note: ***Figures in brackets indicate the percentages of candidates choosing the correct answers.***

Paper 1 (Section B)

				Marks
1.	(a)	(i)	table number, staff number, number of customers, amount of discount	1×2
		(ii)	Check whether the input data is a non-negative number / a whole number / integer.	1, 1
		(iii)	number of lunch sets ordered, availability of lunch set, input time	1×2
	(b)		Resolution, colour depth	1×2
	(c)	(i)	Ada can use `SUM` to calculate the total daily revenue.	1
		(ii)	It can generate better reports with unified formats. The data extraction (SQL) is more flexible.	1 1
2.	(a)		instant messaging (instant communication software), P2P application, FTP application, cloud-based storage	1×3
	(b)		There are many connections (users) to the AP and each user will share a narrower bandwidth. OR The airport management sets a bandwidth limit on each connection so as to prevent the bandwidth being occupied by a small number of users.	1 1
	(c)		Authentication purpose / encryption purpose / a better control of network resources ① Security ① Security + authentication ① Security + encryption	1×2
	(d)		She needs a UTP (Cat5) cable and a wireless router to build a WiFi network in the room so that the three devices can connect to the Internet through the router. OR She converts the notebook computer as a hotspot so that the tablet computer and the smart phone can connect to the Internet through the notebook computer. (hardware + connection)	1+1
	(e)		Text editor: Text editor is available in all OS. / The codes of the web page can be concise. Web authoring tool: Built-in tools/functions facilitate the work. / WYSIWYG / templates provided / user-friendly	1 1
	(f)	(i)	Avoid unauthorised person opening the file. / Authenticate sender's identity.	1
		(ii)	Ms Wong uses a David's public (encryption) key to encrypt the file. Once David receives the encrypted file, he can use his private (decryption) key to decrypt the file. OR Ms Wong uses her private (encryption) key to encrypt the file. Once David receives the encrypted file, he can use Ms Wong's public (decryption) key to decrypt the file.	1, 1

				Marks
3.	(a) (i)	0, 1, 1, 2, 3, 5, 8	(-1 for 1 mistake)	2
	(ii)	0, 1, 1, 2, 3	(-1 for 1 mistake)	2
	(iii)	7		1
	(b) (i)	When the application is executed, a process is divided into different portions/computational threads and executed in different CPUs independently at the same time.		1, 1
	(ii)	The system consists of components which interact with each other (managed by a program) through a networked environment in order to execute the application.		1, 1
	(c) (i)	There is no purchase cost for non-commercial purpose.		1
	(ii)	Source codes are given in open source software.		1
	(iii)	Developers and users (multiple parties) can contribute and develop the software continuously.		1,1
4.	(a) (i)	The Hong Kong Identity card number is personal data / private information.		1
	(ii)	It is because email address is unique.		1
	(iii)	It is because `CLASS` and `CLASSNO` will be updated every year.		1
	(b) (i)	1A Ho King Wan 1B Wong Pak Ting 1B Fan Hoi Kan 1C Cheng Ching Yee	① correct fields in order (`CLASS`, `USERNAME`) ① 4 records with correct order (1A→1B→1C)	2
	(ii)	3HgQ7@e		1
	(iii)	The password should be long enough / have 8 characters or more. The password should comprise characters and numbers. The password should not be well-known (easy-to-guess) information.		1×2
	(c)	Enable the password-protected attribute of the spreadsheet file. (application level) Enforce the access right control. (OS level) Encrypt the file with a key known by Mr Chan only. (file encryption) Store the file in a secure portable storage device.		1×2
	(d) (i)	Unicode supports both traditional and simplified Chinese characters. / GB code/Big-5 code requires less storage space.		1
	(ii)	Compile a template letter and a student data file and do mail merge.		1

			Marks
5.	(a)	When students watch an English programme, they have to answer some questions and check the answers online.	1+1
		Students watch a video of an experiment online and provide input to change the process.	1+1
		① e-learning activity + ① interaction (Other examples: Forum/Discussion: Students ask questions and teachers give replies. Assignment submission: Students submit homework and teachers give comment/marks. Video conferencing/Instant Messaging: Students discuss subject matters. Interactive Game: Students learn English vocabulary through playing an interactive game.)	
	(b)	It has a higher computational power and a larger screen. (Stable/faster data transfer rate / easier for typing / more programs can be installed)	1, 1
	(c) (i)	It is smaller file size. Text format files can be edited using any text editor.	1 1
	(ii)	Email: Students can submit the reports anytime and anywhere with Internet access. / It is simple because no special network (access right) setting is required. / Email is cross-platform. / Email can provide the identity of the student. / Email can include remarks/descriptions of the reports.	1
		School network drive: It is easy for teachers to retrieve all reports at once. / It provides a larger storage capacity / supports larger file size. / The file management is centralised.	1

Paper 2A

Marks

1. (a) (i)
```
SELECT TITLE, PRICE FROM BOOKS                    2
WHERE AUTHOR = 'CHARLES DICKENS'        ①
ORDER BY TITLE ASC                      ①
```

(ii)
```
SELECT TITLE FROM BOOKS                           2
WHERE TITLE LIKE '%AUST%'       ①
AND CAT = 'TOURISM'             ①
```

(iii)
```
SELECT SNAME FROM SHELF                           3
WHERE SCODE NOT IN                  ①
  (SELECT SCODE FROM BOOKS          ①
   WHERE CAT = 'FICTION')           ①
```

(iv)
```
SELECT CAT, SUM(PRICE) FROM BOOKS, SALES    ①     3
WHERE SALES.ISBN = BOOKS.ISBN               ①
GROUP BY CAT                                ①
```

(b) Referential integrity 1
It causes problem when the sales revenue has to be evaluated. 1

(c) Decompose SALES into two tables. 2
T1(TNO, SDATE)
T2(TNO, ISBN, QTY)
where QTY is the quantity of the book.

① Practical idea

2. (a) (i) It improves the speed of searching. 1

(ii)
```
CREATE INDEX IND ON CAND(CNO)                     2
```
① SUBJCODE

(iii) WHERE 1

(b) (i) The field is more frequently accessed by SQL commands. 1

(ii) The overhead on the index file is very large. 1

(c)
```
SELECT CNO, CNAME FROM CAND WHERE CDOB <="1990-12-31"   2
```
① YEAR(CDOB) <= 1990

(d) TNO 1

(e) Select those markers and candidates come from the same training centres. 1

Marks

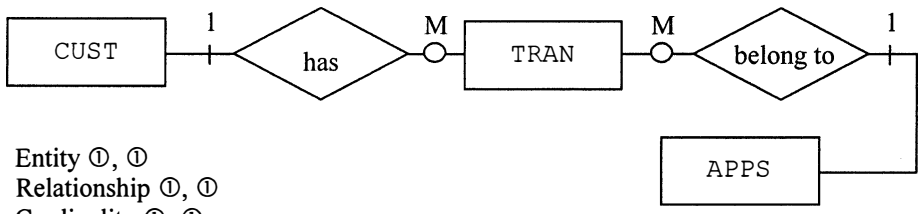
(f) (i) CAND(CNO, CNAME, SEX, CDOB, TNO, SBJCODE) 1

SBJ(SBJCODE, SBJNAME) 1
Primary key: SBJCODE

(ii) Amount of data duplication is reduced. / Avoid data anomalies (data integrity is upheld) 1

(iii) Querying a normalised database might incur significant overhead because the retrieval of data from multiple tables needs to locate and join different tables in order to process the desired data. Join operations reduce database performance. 1

3. (a) 6



Entity ①, ①
Relationship ①, ①
Cardinality ①, ①

(b) A prototype is an early sample/version of the store. 1
Mr Chan wants to collect users' feedback and try to build the expected deliverable without having major changes when the store is developed. It enhances the precision of the system by relevant parties. 1

(c) (i) The format of some current data may not be suitable for the new system. A conversion should be taken place in order to be applicable to the new system. 1

(ii) He cannot use some real data for testing. 1
He needs to spend much effort to create some pseudo data for users to test. 1

(d) (i) These web pages may include many data retrieval requests to the database server from time to time that are over the capacity of the database. 2

(ii) Fine-tune the SQL commands / Install more servers / Fine-tune the balancing between database servers 2

				Marks
4.	(a)	(i)	Boolean	1
		(ii)	`AVER` It can be calculated by `RATING`.	1 1
		(iii)	`RATING` It has to be a positive integer ranging from 0 to 10/other values given by the viewer has to be rejected.	1 1
	(b)	(i)	Design database schema. / Analyse query statistics. / Optimise SQL commands.	2
		(ii)	`UPDATE, INSERT, DELETE, DROP, ALTER`	1×2
	(c)	(i)	A candidate key is similar to a primary key that it can uniquely identify records. (uniqueness)	1
		(ii)	URL	1
	(d)		A distributed database model supports multiple locations. Each location has its own database so that the network traffic can be reduced.	1
			A parallel database model supports concurrent operations such as SQL requests from users. The server can break down a SQL request into a number of execution threads.	1
	(e)	(i)	Distributed database: $300,000 + 100,000 \times 5 = 800,000$ Parallel database: $900,000 + 100,000 \times 2 = 1,100,000$ Distributed database model is better. ① calculation	2
		(ii)	$300,000 + n \times 5 = 900,000 + n \times 2$ $n = 200,000$ When there are more than 200,000 queries per month, the parallel database model is better. ① calculation	2

Paper 2A

Marks

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WHERE SALES.ISBN = BOOKS.ISBN               ①
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where QTY is the quantity of the book.

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SELECT CNO, CNAME FROM CAND WHERE CDOB <="1990-12-31"   2
```
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Marks

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Primary key: SBJCODE

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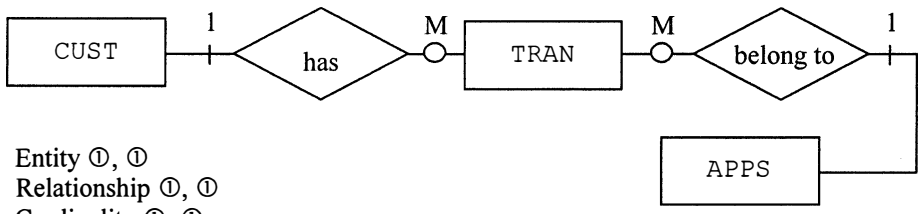
3. (a) 6



Entity ①, ①
Relationship ①, ①
Cardinality ①, ①

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(ii) He cannot use some real data for testing. 1
He needs to spend much effort to create some pseudo data for users to test. 1

(d) (i) These web pages may include many data retrieval requests to the database server from time to time that are over the capacity of the database. 2

(ii) Fine-tune the SQL commands / Install more servers / Fine-tune the balancing between database servers 2

				Marks
4.	(a)	(i)	Boolean	1
		(ii)	`AVER` It can be calculated by `RATING`.	1 1
		(iii)	`RATING` It has to be a positive integer ranging from 0 to 10/other values given by the viewer has to be rejected.	1 1
	(b)	(i)	Design database schema. / Analyse query statistics. / Optimise SQL commands.	2
		(ii)	`UPDATE, INSERT, DELETE, DROP, ALTER`	1×2
	(c)	(i)	A candidate key is similar to a primary key that it can uniquely identify records. (uniqueness)	1
		(ii)	URL	1
	(d)		A distributed database model supports multiple locations. Each location has its own database so that the network traffic can be reduced.	1
			A parallel database model supports concurrent operations such as SQL requests from users. The server can break down a SQL request into a number of execution threads.	1
	(e)	(i)	Distributed database: $300,000 + 100,000 \times 5 = 800,000$ Parallel database: $900,000 + 100,000 \times 2 = 1,100,000$ Distributed database model is better. ① calculation	2
		(ii)	$300,000 + n \times 5 = 900,000 + n \times 2$ $n = 200,000$ When there are more than 200,000 queries per month, the parallel database model is better. ① calculation	2

Paper 2C

Marks

1. (a) (i) The image will not be distorted/blurred (quality) when the window is enlarged. / The image can be resized without any loss of information and there will not be ragged edges in the image after the resize. / The file size is smaller. — 1

(ii) It is commonly used and can be read by most bitmap-based software / browsers. (different platforms/OS) — 1

(b) Adjust the display locations on the screen. — 1
Adjust the size (width/height) of the popup window. — 1

Or give an example:
window.open(href, windowname, 'width=400,height=200,left=50, top=100, scrollbars=yes');

(c) (i) Client-side scripting is used to check the blank input. — 1, 1

(ii) Server-side scripting is used to validate the constellation stored in the database in the server. — 1, 1

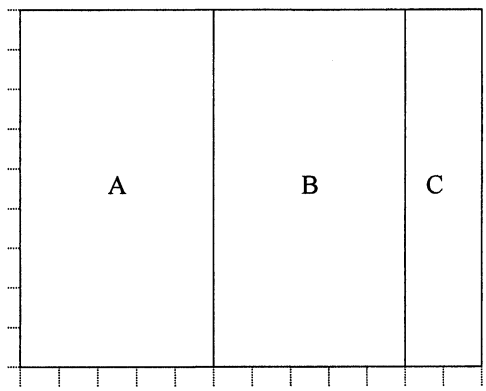
(d) (i) GIF / PNG — 1

(ii) The map and the images are overlaid with each other. The images can be controlled by CSS codes so that the image with the selected walking path is shown while the other images are blocked. — 1, 1

(e) (i) The sound is authentic. / It comprises human voice. — 1

(ii) The file size is smaller. / Precise edit can be conducted easily. — 1

(f) — 3



horizontal / column frames ①
A, B size equal ①
C size = 200 pixels ①

			Marks
2.	(a)	It helps web developers understand the structure of the web site. (topics / categories / content / information / hyperlink) It helps users navigate the web site. (the target page) It encourages search engines to index the entire school web site. (keywords to search engines)	1×2
	(b) (i)	Anchor (button / hyperlink back to top)	1
	(ii)	Create a printable version and use CSS to avoid a page break in the paragraph.	1, 1

Reference:

```
<style>
p.Unbreakable{  page-break-inside: avoid; }
...
</style>
<body>
...
<p class "Unbreakable">School motto<br>Love our children!
...
```

	(c) (i)	It can attract users' attention. (more interactive elements)	1
	(ii)	No, users will be difficult to click the link when it is moving.	1
	(d) (i)	Apply a style to the entire web page.	1, 1
	(ii)	Apply the same style to the web pages in the web site when necessary.	1, 1
	(e)	Reduce the frame rate (FPS). Reduce the resolution. Limit the number of network connections / the number of viewers / the multicast. Increase the bandwidth. Increase the compression ratio / Use a file format with a higher compression rate or small file size. Reduce the bit rate. Stop other services in the server.	1×3

				Marks
3.	(a)	(i)	grouping	1
		(ii)	flipping (mirroring)	1
	(b)	(i)	tween	1
		(ii)	time interval between two images / frame rate duration total number of images/frames	1×2
		(iii)	MP4 supports menus/subtitles/chaptering. MP4 is fully compatible with H.264 (e.g. better compression). / smaller file size MP4 can be directly embedded within the HTML5 Internet standard. (easier to be inserted in web pages)	1×2
	(c)	(i)	500 kbps × 60 s = 3.6 MB (3.5MB to 4MB or equivalent) The actual file size is much smaller because data compression is used in the video.	1 1
		(ii)	(10 × 1024 × 1024 × 8) ÷ 16 ÷ 2 ÷ 60 = 43.7 KHz (40KHz to 44.1KHz or equivalent) ① dealing with the stereo in the expression	2
	(d)	(i)	Diffusion, polarizer, red eyes, contrast, brightening, blur, noise, water mark (with description or self-explained examples)	1×2
		(ii)	1024 × 540 ① Correct aspect ratio (in whole number) less than 1024 × 540	2

Marks

4. (a) It has smaller file size. / It supports form filling. / It supports text copying. / It can be read by screen reader programs. / It can contain multiple images. / It can include multimedia elements (e.g. audio and video). / It can include hyperlinks. / The text can be shown clearly (without sigzag) when its size is increased. 1×2

(b) (i) The question page and the answer page are not synchronized / not in the same horizontal line. 1
Note: accept concrete examples such as
'It is very easy to answer Q8 in the text box of A7.'

(ii) Combine two frames / iframe / one-by-one 2×3
Each design:
Draft - practical (Synchroized)①
Design - concise (Navigation) ①
Explanation - clear ①
Note:
1. The design should be workable if there are more than 10 questions.
2. For two similar designs, award the design with the higher mark only.

(c) (i) 2 + 4 1
3 + 6 1

(ii) All questions depend on Question 1. (predictable) / Q is 2 times of P. / All answers are multiples of 3 1

(iii)
```
For i from 1 to N                    ① iterations
      P[i] ← MyRand()                ① Assignment (index i)
      Q[i] ← MyRand() or P[i]*2      ① All correct
```
3

Or

```
temp = MyRand()
For I from 1 to N
      P[i] = temp
      Q[i] = temp *2
      temp = temp + 1
```

Paper 2D

Marks

1. (a) (i) Implementation 1

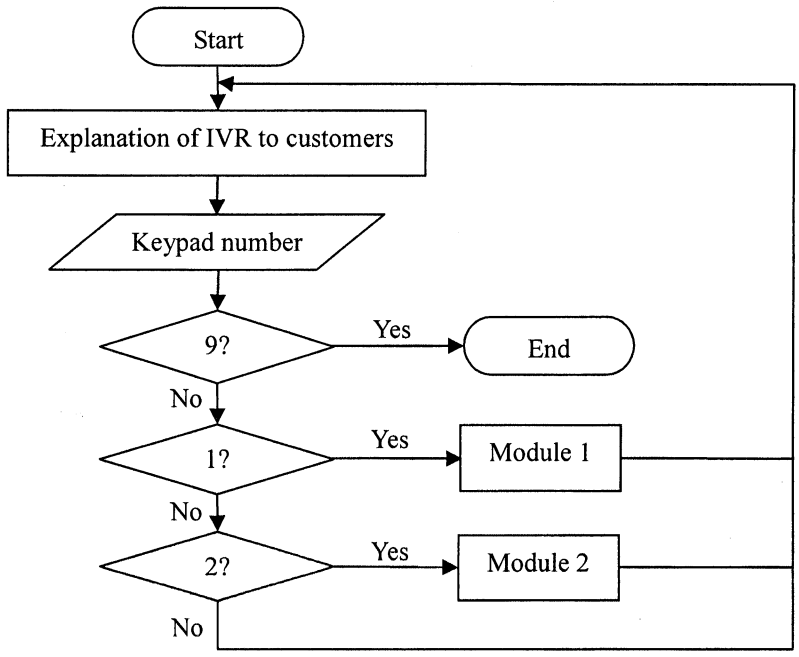
(ii) Integration 1

(iii) A system test is done by developers while a UAT involves ultimate users to test the system with authentic data. (people & data type) 1

(iv) Review and refine the previous process. 1

(b) (i) 3 1

(ii) 3



(c) (i) The service can be based on the first-in-first-out policy. 1

(ii) 4

[Pascal version]

```
Qfirst = Qlast          ①
Q[Qfirst]               ①
(Qfirst + 1) mod n      ①, ①
+1 ① mod n ①
```

[Visual Basic version]

```
Qfirst = Qlast          ①
Q[Qfirst]               ①
(Qfirst + 1) mod n      ①, ①
```

[C version]

```
Qfirst == Qlast         ①
Q[Qfirst]               ①
(Qfirst + 1) % n        ①, ①
```

[Java version]

```
Qfirst == Qlast         ①
Q[Qfirst]               ①
(Qfirst + 1) % n        ①, ①
```

(iii) The queue is empty. 1

(d) (i) `n - 1` 1

(ii) Some record cannot be retrieved using `POP()`. 1
/ Some elements in the queue will be overwritten.

Marks

2. (a) (i)

2	false	false	true	false	true	false

2

(ii) n^2 or 36 1

(b) (i) The values they store are the same. 2

(ii) When `i=j`, he does not need to store the information as it must be false. 1
When `j<i`, the `(j,i)`-th element in A is the same as the `(i,j)`-th element with `i<j`, so these entries need not to be stored. 1
The total number of entries with `i<j` is 15.

(c) (i) (1,5) (2,4) (2,6) (3,5) (4,6) (and their reverses) 2

(ii) `false (or 0)` ① 3
`p,i` } or their reverses; `i` and `j` are interchangeable ②
`p,j` }

(d) The development of mobile applications requires a short development life cycle. Library functions in object-oriented programming can help shorten the development life cycle. (reusability) 2

3. (a) (i) Amy, Jade 2

(ii) any value larger than the array size / negative values 1

(iii) 4 1

(b) 4

Address	Content	Previous	Next	
0	START	-1	3	
1	John	3	4	← negligible
2	Mary	4	-1	
3	Susan	0	4	
4	Fiona	3	2	

① each row

(c) Advantage: The linked list can be transverse in two ways. 1
Disadvantage: It requires more storage. 1

(d) (i) Candy, Amy, Daisy 3

(ii) It saves storage space. 1

Marks

4. (a) (i) FALSE — 3
TRUE
TRUE

(ii) It checks whether the string in `ST` is a palindrome (回文) or not. — 1

(iii) for `i` from `1` to `n/2` — 1

(b) FALSE — 1
0 — 1
`MyLen(T2)` — 1
`i+j-1` (i+j ①) — 2

(c) - Declaration — 6
- Initialisation of a flag (`FOUND`) / maximum length
- Any loop: 1 to length of `T2` (`n2`)
- Check all possible substrings in `T2` (looping for '1+2+3+...+n2' checking)
- Use of `IsSub` without correct parameters
- All correct
(① @)

[Pascal version]

```
procedure LongSub(T1, T2 : string);
var i, j : integer;
    found : Boolean;
begin
  found := false;
  i := n2;
  while not found and (i >= 1) do begin
     j := n2 - i + 1;
     while not found and (j >= 1) do begin
        if IsSub(T1, MyCopy(T2, j , i)) then
           begin
              found := TRUE;
              writeln('The length is ', i);
           end;
        j := j - 1;
     end;
     i := i - 1;
  end;
end;
```

`MyLen(MyCopy(T2,j,i))`

[C version]

```
void LongSub( char T1[],  char T2[]) {
     int i, j, found;
     char temp[50];
     found = 0;
     i = n2;
     while (!found && i >= 1) {
          j = n2 - i + 1;
          while (!found && j >= 1) {
               MyCopy(T2, temp, j, i);
               if (IsSub(T1, temp)) {
                  found = 1;
                  printf("The length is %i\n", i);
                  }
               j--;
          }
          i--;
     }
}
```

[Visual Basic version]

```
Private Sub longSub(T1 As String, T2 As String)
  Dim i As Integer
  Dim j As Integer
  Dim found As Boolean
  found = False
  i = n2
  Do While (Not found And (i >= 1))
    j = n2 - i + 1
    Do While (Not found And (j >= 1))
      If IsSub(T1, MyCopy(T2, j, i)) Then
        found = True
        msg = msg & "The length is " & i & vbNewLine
      End If
      j = j - 1
    Loop
    i = i - 1
  Loop
End Sub
```

[JAVA version]

```
private static void LongSub( String T1,  String T2) {
     int i, j;
     boolean found = false;
     i = n2;
     while (!found && i >= 1) {
          j = n2 - i;
          while (!found && j >= 0) {
               if (IsSub(T1, MyCopy(T2, j,j+i))) {
                  found = true;
                  System.out.println(j+"  The length is "+i);
                  }
               j--;
          }
          i--;
     }
}
```