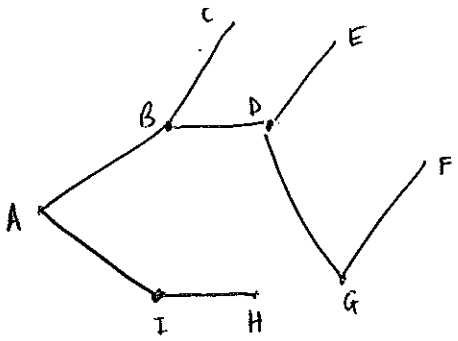
Jan '07

1a)

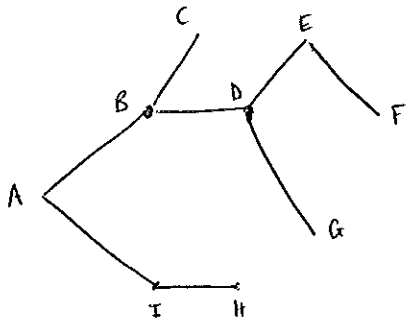
AB	5.5
BC	8
AI	9
BD	13
DE	9
DG	11
GF	12
IH	16.5
	84

b) 84

c)

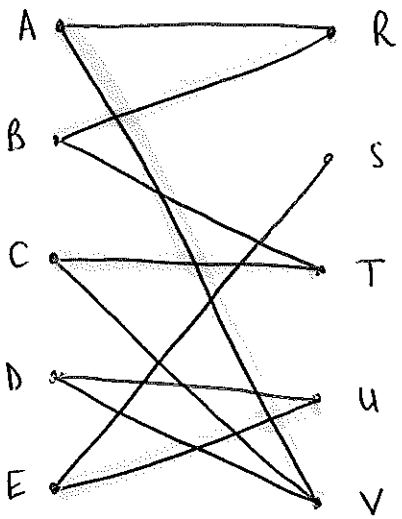


OR



d) 2

2a)



b) D - U + E - S

AV
BR
CT
DU
ES

3a) A → B → C → D → A
8 13 17 26 = 64

b) A → D → C → B → A
11 18 9 14 = 52

c) A → C → B → D → A
6 9 25 26 = 66

d) (b) ADCBA

4 (a) A student is using a bubble sort to rearrange seven numbers into ascending order.

Her correct solution is as follows:

								C	S
Initial list	18	17	13	26	10	14	24		
After 1st pass	17	13	18	10	14	24	26	6	5
After 2nd pass	13	17	10	14	18	24	26	5	3
After 3rd pass	13	10	14	17	18	24	26	4	2
After 4th pass	10	13	14	17	18	24	26	3	1
After 5th pass	10	13	14	17	18	24	26	2	0

Write down the number of comparisons and swaps on each of the five passes.

(6 marks)

(b) Find the maximum number of comparisons and the maximum number of swaps that might be needed in a bubble sort to rearrange seven numbers into ascending order.

(2 marks)

If in descending order

Comparisons	Swaps
6	6
5	5
4	4
3	3
2	2
1	1
21	21

5ai)

A	B	C	D
2	3		
		0	0
		2	
			3
		4	
			6
		6	

ii)

A	B	C	D
6	8		
		0	0
		6	
			8
		12	
			16
		18	
			24
		24	

b) Finds the LCM of A and B

c) 600

6a) $1000x + 500y \leqslant 9000$

$\div 500$

$2x + y \leqslant 18$

b) $x \geqslant 2$

$y \geqslant 5$

$y \geqslant 2x$

$y \leqslant 3x$

c) see next sheet

d) maximum width

$x = 4.5$

and $y = 9$ at this point

7ai) see next sheet 465

ii) CASINO

bi) ASBM = 255

ii) odd vertices C, A, S, M

CA = 75

CS = 135

CM = 330

SM = 195

AM = 255

AS = 60

CA + SM = 270

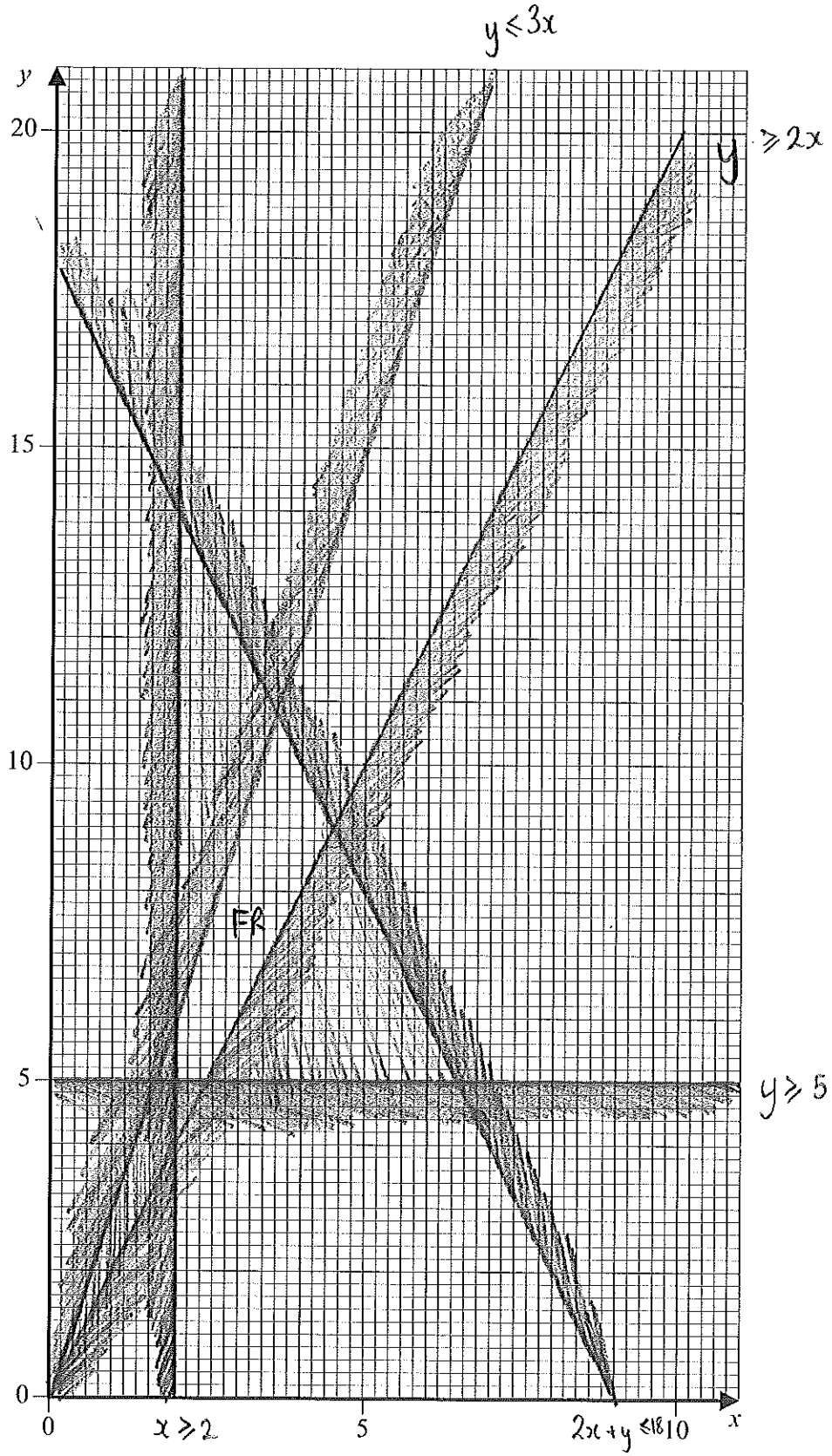
CS + AM = 390

CM + AS = 390

Minimum time = 2280 + 270

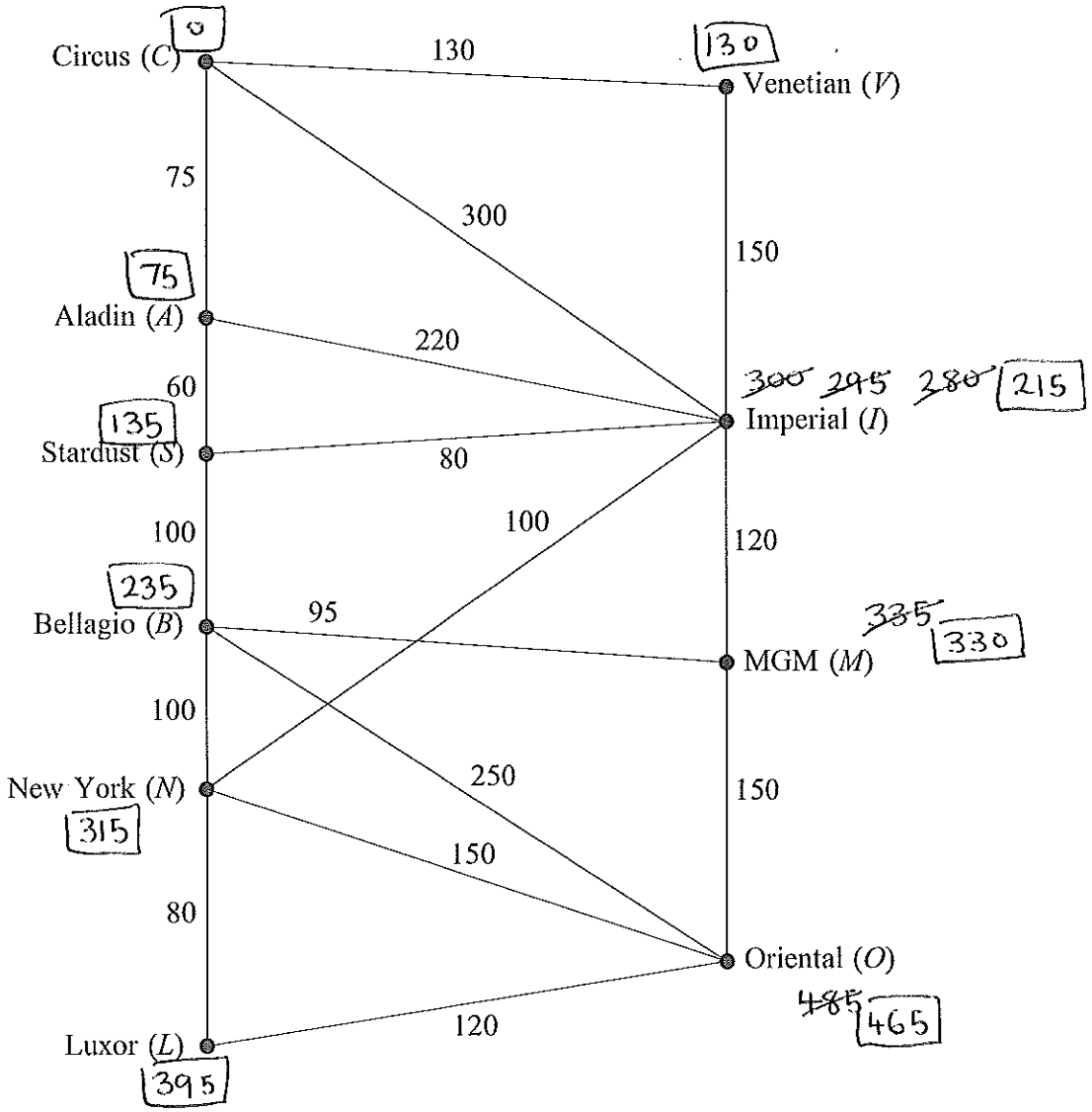
= 2550

Figure 1 (for use in Question 6)



7 [**Figure 2**, printed on the insert, is provided for use in this question.]

The network shows the times, in seconds, taken by Craig to walk along walkways connecting ten hotels in Las Vegas.



The total of all the times in the diagram is 2280 seconds.

(a) (i) Craig is staying at the Circus (C) and has to visit the Oriental (O).

Use Dijkstra's algorithm on **Figure 2** to find the minimum time to walk from C to O. *(6 marks)*

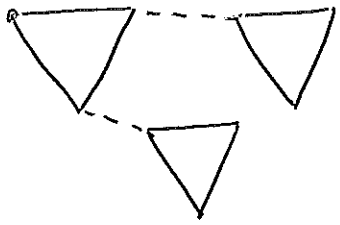
(ii) Write down the corresponding route. CASINO *(1 mark)*

(b) (i) Find, by inspection, the shortest time to walk from A to M. *(1 mark)*

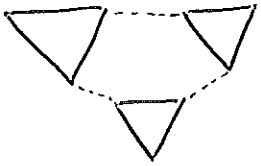
(ii) Craig intends to walk along all the walkways. Find the minimum time for Craig to walk along every walkway and return to his starting point. *(6 marks)*

Turn over for the next question

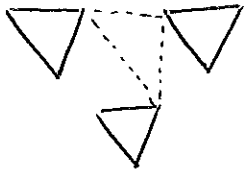
8ai) 2



ii) 3



iii) 3



bi) n must be odd

ii) 3