OS Sheet 7

Problem 1:

a)

	17 Kib	8 Kib	10 Kib	21 Kib	12 Kib	13 Kib
11 Kib	17 Kib	8 Kib	10 Kib	21 Kib	1 Kib	13 Kib
9 Kib	17 Kib	8 Kib	1 Kib	21 Kib	1 Kib	13 Kib
7 Kib	17 Kib	1 Kib	1 Kib	21 Kib	1 Kib	13 Kib
16 Kib	1 Kib	1 Kib	1 Kib	21 Kib	1 Kib	13 Kib

b)

	17 Kib	8 Kib	10 Kib	21 Kib	12 Kib	13 Kib
11 Kib	17 Kib	8 Kib	10 Kib	10 Kib	12 Kib	13 Kib
9 Kib	8 Kib	8 Kib	10 Kib	10 Kib	12 Kib	13 Kib
7 Kib	8 Kib	8 Kib	10 Kib	10 Kib	12 Kib	6 Kib
16 Kib	Can't allocate without compactio (stays same)	Can't allocate without compactio (stays same)	Can't allocate without compactio (stays same)	Can't allocate without compactio (stays same)	Can't allocate without compactio (stays same)	Can't allocate without compactio (stays same)

c)

	17 Kib	8 Kib	10 Kib	21 Kib	12 Kib	13 Kib
11 Kib	6 Kib	8 Kib	10 Kib	21 Kib	12 Kib	13 Kib
9 Kib	6 Kib	8 Kib	1 Kib	21 Kib	12 Kib	13 Kib
7 Kib	6 Kib	1 Kib	1 Kib	21 Kib	12 Kib	13 Kib
16 Kib	6 Kib	1 Kib	1 Kib	5 Kib	12 Kib	13 Kib

d)

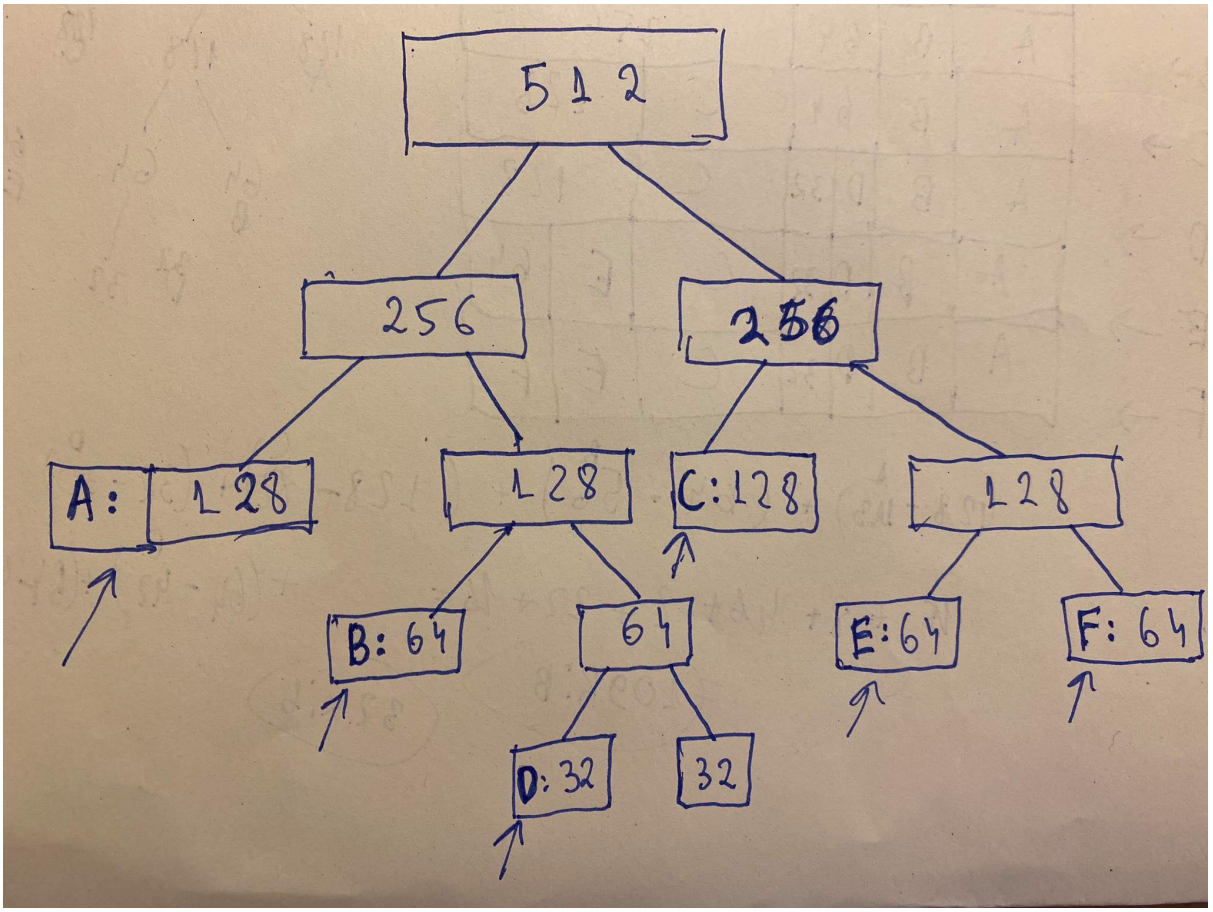
	17 Kib	8 Kib	10 Kib	21 Kib	12 Kib	13 Kib
11 Kib	6 Kib	8 Kib	10 Kib	21 Kib	12 Kib	13 Kib
9 Kib	6 Kib	8 Kib	1 Kib	21 Kib	12 Kib	13 Kib
7 Kib	6 Kib	8 Kib	1 Kib	14 Kib	12 Kib	13 Kib
16 Kib	6 Kib	1 Kib	1 Kib	14 Kib	Can't allocate without compactio (stays same)	Can't allocate without compactio (stays same)

Problem 2:

a)
Diagram:

	512 Kib							
A →	**A**	**128 Kib**			**256 Kib**			
B →	**A**	**B**	**64 Kib**		**256 Kib**			
C →	**A**	**B**	**64 Kib**		**C**	**128 Kib**		
D →	**A**	**B**	**D**	**32**	**C**	**128 Kib**		
E →	**A**	**B**	**D**	**32**	**C**	**E**	**64 Kib**	
F →	**A**	**B**	**D**	**32**	**C**	**E**	**F**	

Binary tree:



b)
Overall Internal Fragmentation =
(128 - A) + (64 - B) + (128 - C) + (32 - D) + (64 - E) + (64 - F) = 15 + 8 + 46 + 2 + 22 + 16 = **109 Kib**

Largest chunk of memory that still can be allocated is **32 KiB** right next to D, since all the other segments are already allocated.

c)
Suppose Process **C** returns its allocation, we'll have the resulting diagram:

← C	**A**	**B**	**D**	**32**	**128**	**E**	**F**

To accommodate **G: 132 KiB** allocation we need at least **256 Kib** Free segment and the biggest segment we have in this diagram is **128 Kib.** It would have been possible if **E and F** wouldn't have taken 128 Kib next to the free 128 Kib, but that's also not true.
Answer: No.

Problem 3:

a) FIFO

String	1	4	2	3	4	4	1	3	2	1
Frame 0	1	1	2	2	4	4	4	3	3	1
Frame 1		4	4	3	3	3	1	1	2	2
Page Fault	x	x	x	x	x		x	x	x	x

Page fault count: 9

String	1	4	2	3	4	4	1	3	2	1
Frame 0	1	1	1	3	3	3	3	3	3	3
Frame 1		4	4	4	4	4	1	1	1	1
Frame 2			2	2	2	2	2	2	2	2
Page Fault	x	x	x	x			x			

Page fault count: 5

b) LRU

String	1	4	2	3	4	4	1	3	2	1
Frame 0	1	1	2	2	4	4	4	3	3	1
Frame 1		4	4	3	3	3	1	1	2	2
Page Fault	x	x	x	x	x		x	x	x	x

Page fault count: 9

String	1	4	2	3	4	4	1	3	2	1
Frame 0	1	1	1	3	3	3	3	3	3	3
Frame 1		4	4	4	4	4	4	4	2	2
Frame 2			2	2	2	2	1	1	1	1
Page Fault	x	x	x	x			x		x	

Page fault count: 6

c) BO

String	1	4	2	3	4	4	1	3	2	1
Frame 0	1	1	2	3	3	3	3		2	
Frame 1		4	4	4	4	4	1		1	
Page Fault	x	x	x	x			x		x	

Page fault count: 6

String	1	4	2	3	4	4	1	3	2	1
Frame 0	1	1	1	1	1	1	1	1	1	1
Frame 1		4	4	4	4	4	4	4	2	2
Frame 2			2	3	3	3	3	3	3	3
Page Fault	x	x	x	x					x	

Page fault count: 5