Serie of exercises №3

Exercise №1 :

Consider a paging system whose page size is equal to 2KO, physical memory is 10KO and the memory word is a single byte.

1) How many page frames does this memory contain?

2) Consider a program of size 16KO, which refers to the following logical addresses:

1, 4328, 35, 3000, 7895, 300, 9875, 2050, 150, 11220, 2489, 9000, 15648, 8195, 13252, 14165, 10250, 260

- For each address, give the page number and the displacement within the page (p, d).
- Deduce the chain of pages referenced during execution of this program.

3) Calculate the page fault rate resulting from a FIFO and LRU replacement. Which algorithm minimizes this rate?

Exercise №2 :

Or the following 4 processes:

N° of processes	Arrival time	Estimated execution time	Start of execution time	End of run time	Response time
1	12.00	02.50			
2	10.00	01.50			
3	09.00	03.00			
4	11.50	00.50			

1/ Complete the table according to the policies: FCFS and SJF without preemption.

2/ Use a diagram to describe the scheduling of these 4 processes according to the SRTF policy.

3/ Calculate the average response time for each of the above policies.

Exercise №3 :

Five processes arrive on a single-processor machine at different times as follows:

N° of processes	Arrival time	Execution time	Priority
1	00 :00	10 mn	1
2	00 :17	05 mn	2
3	00 :05	12 mn	3
4	00 :10	04 mn	4
5	00 :05	03 mn	1

1/ Calculate the response time of each process using the following algorithms:

FCFS, SJF, Non-preemptive scheduling by priority (5 is the highest priority), Tourniquet with a time quantum of 4 min.

2/ What is the average response time of each algorithm? Which algorithm performs best?

Exercise №4 :

A single-processor system contains the following processes:

Process	Execution time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

All these processes arrived at the same time at time 0 and in the following order: P1, P2, P3, P4, P5

1/ Draw four processor occupancy graphs for the following allocation policies: (1) FCFS (2) SJF, (3) priority without preemption (1 = highest priority), and (4) turnstile (quantum = 1).

2/ Calculate the response time of each process for each of the four allocation policies.

3/ Calculate the waiting time of each process for each of the four allocation policies.

4/ Which of the four policies results in an optimal mean waiting time (of the five processes)? Why or why not?

5/ Now suppose that process P1 executes an I/O instruction after 5 time units of its execution, and that this I/O operation takes one time unit (so, if there were no other processes, P1 would have an execution time of 11 time units).

- Draw the occupancy graphs requested in question 1 for this new scenario.
- Recalculate the response times and waiting times of the processes for each of the policies FCFS, SJF, turnstile with quantum = 1. What do you notice? Which has the best mean waiting time?