1.
    a. Contiguous Memory
        i. External fragmentation: Holes in memory are created when old processes are finished and new ones are created.
        ii. Internal fragmentation: There is no internal fragmentation.
        iii. Share Code: Shared code is not allowed in contiguous memory.
    b. Pure segmentation
        i. External fragmentation: Holes in memory can occur when segments of a finished process are replaced by segments of a new process.
        ii. Internal fragmentation: There is no internal fragmentation.
        iii. Share Code: A segment of process can be shared with a different process.
    c. Pure Paging
        i. External fragmentation: There is no external fragmentation.
        ii. Internal fragmentation: When a process is allocated into pages, some pages may not be entirely used, which causes holes internally.
        iii. Share Code: Pages of a process can be shared with a different process.
2.
    a. Page number: 3, Offset: 13
    b. Page number: 41, Offset: 111
    c. Page number: 210, Offset: 210
    d. Page number: 634, Offset: 784
3.
    a. 219 + 430 = 649
    b. 2300 + 10 = 2310
    c. 500 is larger than the length, 100, so this is an address error
    d. 1327 + 400 = 1727
    e. 112 is larger than the length, 96, so this is an address error
4. Memory chunks can become large and swapping them into back store is difficult. By paging them in a page table, the memory chunk can be divided into pages of fixed size and those can be easily swapped into back store.
5.
    a. 0x9EF, Page number = 1001, Page offset = 1110,1111. Physical address = 0000,1110,1111 = 0x0EF
    b. 0x111, Page number = 0001, Page offset = 0001,0001. Physical address = 0010,0001,0001 = 0x211
    c. 0x700, Page number = 0111, Page offset = 0. Note, page 7 is not in memory, so D is loaded into page 7. Physical address = 1101,0000,000 = 0xD00
    d. 0x0FF, Page number = 0000, Page offset =1111,1111 .Note, page 0 is not in memory, so E is loaded into page 0. Physical address = 1110,1111,1111 = 0xEFF.

6. 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6
   a. LRU
      i. 1 Frame:
      Faults: 20

1	**2**	**3**	**4**	**2**	**1**	**5**	**6**	**2**	**1**	**2**	**3**	**7**	**6**	**3**	**2**	**1**	**2**	**3**	**6**

      ii. 2 Frames:
      Faults: 18

1	1	**3**	3	**2**	2	**5**	5	**2**	2	2	2	**7**	7	**3**	3	**1**	1	**3**	3
	2	2	**4**	4	**1**	1	**6**	6	**1**	1	**3**	3	**6**	6	**2**	2	2	2	**6**

      iii. 3 Frames:
      Faults: 15

1	1	1	**4**	4	4	**5**	5	5	**1**	1	1	**7**	7	7	**2**	2	2	2	2
	2	2	2	2	2	2	**6**	6	6	6	**3**	3	3	3	3	3	3	3	2
		3	3	3	**1**	1	1	**2**	2	2	2	2	**6**	6	6	**1**	1	1	**6**

      iv. 4 Frames:
      Faults: 10

1	1	1	1	1	1	1	1	1	1	1	1	1	**6**	6	6	6	6	6	6
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	**5**	5	5	5	5	**3**	3	3	3	3	3	3	3	3
			4	4	4	4	**6**	6	6	6	6	**7**	7	7	7	**1**	1	1	1

      v. 5 Frames:
      Faults: 8

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	**6**	6	6	6	6	6	6	6	6	6	6	6	6
			4	4	4	4	4	4	4	4	**3**	3	3	3	3	3	3	3	3
						5	5	5	5	5	5	**7**	7	7	7	7	7	7	7

vi. 6 Frames:
Faults: 7

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
			4	4	4	4	4	4	4	4	4	**7**	7	7	7	7	7	7	7
						5	5	5	5	5	5	5	5	5	5	5	5	5	5
							6	6	6	6	6	6	6	6	6	6	6	6	6

vii. 7 Frames:
Faults: 7

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
						5	5	5	5	5	5	5	5	5	5	5	5	5	5
							6	6	6	6	6	6	6	6	6	6	6	6	6
												7	7	7	7	7	7	7	7

b. FIFO
i. 1 Frame:
Faults: 20

1	**2**	**3**	**4**	**2**	**1**	**5**	**6**	**2**	**1**	**2**	**3**	**7**	**6**	**3**	**2**	**1**	**2**	**3**	**6**

ii. 2 Frames:
Faults: 18

1	1	**3**	3	**2**	2	**5**	5	**2**	2	2	**3**	3	**6**	6	**2**	2	2	**3**	3
	2	2	**4**	4	**1**	1	**6**	6	**1**	1	1	**7**	7	**3**	3	**1**	1	1	**6**

iii. 3 Frames:
Faults: 16

1	1	1	**4**	4	4	4	**6**	6	6	6	**3**	3	3	3	**2**	2	2	2	**6**
	2	2	2	2	**1**	1	1	2	**1**	1	1	**7**	7	7	7	**1**	1	1	1
		3	3	3	3	**5**	5	5	5	**2**	2	2	**6**	6	6	6	6	**3**	3

iv. 4 Frames:
Faults: 14

1	1	1	1	1	1	**5**	5	5	5	5	**3**	3	3	3	3	**1**	1	1	1
	2	2	2	2	2	2	**6**	6	6	6	6	**7**	7	7	7	7	7	**3**	3
		3	3	3	3	3	3	**2**	2	2	2	2	**6**	6	6	6	6	6	6
			4	4	4	4	4	4	**1**	1	1	1	1	1	**2**	2	2	2	2

v. 5 Frames:
Faults: 10

1	1	1	1	1	1	1	**6**	6	6	6	6	6	6	6	6	6	6	6	6
	2	2	2	2	2	2	2	2	**1**	1	1	1	1	1	1	1	1	1	1
		3	3	3	3	3	3	3	3	**2**	2	2	2	2	2	2	2	2	2
			4	4	4	4	4	4	4	4	**3**	3	3	3	3	3	3	3	3
						5	5	5	5	5	5	**7**	7	7	7	7	7	7	7

vi. 6 Frames:
Faults: 10

1	1	1	1	1	1	1	1	1	1	1	1	**7**	7	7	7	7	7	7	7
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	**1**	1	1	1
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	**2**	2	2
			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	**3**	3
						5	5	5	5	5	5	5	5	5	5	5	5	5	5
							6	6	6	6	6	6	6	6	6	6	6	6	6

vii. 7 Frames:
Faults: 7

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
						5	5	5	5	5	5	5	5	5	5	5	5	5	5
							6	6	6	6	6	6	6	6	6	6	6	6	6
												7	7	7	7	7	7	7	7

c. Optimal

i. 1 Frame:
Faults: 20

1	**2**	**3**	**4**	**2**	**1**	**5**	**6**	**2**	**1**	**2**	**3**	**7**	**6**	**3**	**2**	**1**	**2**	**3**	**6**

ii. 2 Frames:
Faults: 15

1	1	**3**	**4**	4	**1**	**5**	**6**	6	**1**	1	**3**	3	3	3	3	**1**	1	**3**	3
	2	2	2	2	2	2	2	2	2	2	2	**7**	**6**	6	**2**	2	2	2	**6**

iii. 3 Frames:
Faults: 11

1	1	1	1	1	1	1	1	1	1	1	**3**	3	3	3	3	3	3	3	**6**
	2	2	2	2	2	2	2	2	2	2	2	**7**	7	7	**2**	2	2	2	2
		3	**4**	4	4	**5**	**6**	6	6	6	6	6	6	6	6	**1**	1	1	1

iv. 4 Frames:
Faults: 8

1	1	1	1	1	1	1	1	1	1	1	1	**7**	7	7	7	7	**1**	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
			4	4	4	**5**	**6**	6	6	6	6	6	6	6	6	6	6	6	6

v. 5 Frames:
Faults: 7

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
			4	4	4	4	**6**	6	6	6	6	6	6	6	6	6	6	6	6
						5	5	5	5	5	5	**7**	7	7	7	7	7	7	7

vi. 6 Frames:
Faults: 7

1	1	1	1	1	1	1	1	1	1	1	1	7	7	7	7	7	7	7	7
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2
			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3
						5	5	**7**	7	7	7	7	7	7	7	7	7	7	7
							6	6	6	6	6	6	6	6	6	6	6	6	6

vii. 7 Frames:
Faults: 7

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
						5	5	5	5	5	5	5	5	5	5	5	5	5	5
							6	6	6	6	6	6	6	6	6	6	6	6	6
												7	7	7	7	7	7	7	7