Q1:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| RS | e | c | b | e | a | g | d | c | e | g | d | a |
| R0 | e | e | e | e | e | e | e | e | e | e | e | e |
| R1 |  | c | c | c | c | c | d | d | d | d | d | d |
| R2 |  |  | b | b | b | b | b | c | c | c | c | c |
| R3 |  |  |  | e | e | e | e | e | e | e | e | e |
| Page fault | x | x | x | x | - | - | x | x | - | - | - | - |

Total :6

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| RS | e | c | b | e | a | g | d | c | e | g | d | a |
| R0 | e | e | e | e | e | e | d | d | d | d | d | d |
| R1 |  | c | c | c | c | c | c | c | e | e | e | e |
| R2 |  |  | b | b | b | b | b | c | c | c | c | c |
| R3 |  |  |  | e | e | e | e | e | e | e | e | a |
| Page fault | x | x | x | x | - | - | x | x | x | - | - | X |

Total: 8

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| RS | e | c | b | e | a | g | d | c | e | g | d | a |
| R0 | e | e | e | e | e | e | d | d | e | e | e | e |
| R1 |  | c | c | c | c | c | c | c | c | e | e | e |
| R2 |  |  | b | b | b | b | b | c | c | c | c | c |
| R3 |  |  |  | e | e | e | e | e | e | e | e | a |
| Page fault | x | x | x | x | - | - | x | x | x | x | - | x |

Total: 9

Q2:

1: True

2: False

3: A page fault occurs when a process tries to access a page that has not been brought into memory

4: True

1, With 8-KB pages and a 48-bit virtual address space, the number of virtual pages is 2^48/2^13, which is 2^35 (about 34 billion).

2, For a 4-KB page size the (page, offset) pairs are (4, 3616), (8, 0), and (14, 2656). For an 8-KB page size they are (2, 3616), (4, 0), and (7, 2656).

[ Note: You should specify your starting index, like either from 0 or from 1 etc.]

3, a) 8212 b) 4100 c) 24684

4, 1, 2

2, 2728

3, 7

4, 2 5 4 1

6, (same)

7, 1 160 265 0 1

8, (=7,)

9, 12

9, Virtual memory: 2^32 bytes

Physical memory: 2^22 bytes

Page size: 4096 bytes = 2^12 bytes

Given physical address: 11123456

10, a, 0 0

b, 110

c, 265

d, 0

11, a, 7

b, 16

12, Consider a swapping system in which the memory consists of the following hole sizes: 10K, 4K, 20K, 15K, 9K. Assume worst fit algorithm is used. Which holes are taken for successive segment requests of 8K

13, 18bits

14, total pages = 2^20

size of page table = 4B \* 2 ^ 20 = 4MB

size of virtual memory = 2^ 20 \* 4KB = 4GB