Q1.

i) la valeur initiale des counters est 0

ii) les counters sont incrémenter lorsqu'un page est associée avec se frame

iii) les counters décrémente lorsqu’un page associée n’est plus requis

iv) le plus petit counter et si il y a 2 avec le même nombres de counter fait first in first out

b)

1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 4 | 4 | 4 | 4\* | 4\* | 4\* | 4\* | 4\* | 4\* | 4\* | 3\* | 3\* | 3\* | 3\* | 5 | 4\* | 4\* | 4\*\* | 4\*\* |
|  |  | 3 | 3 | 3 | 3\* | 3\* | 3\* | 3\* | 3\* | 3\* | 3\* | 3\* | 9 | 9 | 9 | 9\* | 9\* | 9\* | 5 | 5 | 2 |
|  | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 7 | 7 | 7\* | 7\* | 7\* | 7\*\* | 7\*\* | 7\*\* | 7\*\* | 7\*\* | 7\*\* | 7\*\* | 7\*\* |
| 1 | 1 | 1 | 1 | 5 | 5 | 5 | 5 | 6 | 6 | 8 | 8 | 8\* | 8\* | 8\* | 8\*\* | 8\*\* | 8\*\* | 8\*\* | 8\*\* | 8\*\* | 8\*\* |
| **1** | **2** | **3** | **4** | **5** | **-** | **-** | **6** | **7** | **8** | **9** | **-** | **-** | **10** | **-** | **-** | **-** | **11** | **12** | **13** | **-** | **14** |

**14 page faults**

c)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
|  |  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 4 | 4 | 4 | 4 |
|  | 2 | 2 | 2 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 6 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| **1** | **2** | **3** | **4** | **5** | **-** | **-** | **-** | **6** | **7** | **8** | **-** | **-** | **9** | **-** | **-** | **-** | **-** | **10** | **-** | **-** | **11** |

**11 page faults**