```
COMP9315 Sample Exam, Q4 Sample Solution

(a) sequential scan, b=20, B=5, repl=LRU

#requests = 20 (obvious)
#reads    = 20 (no re-use)
#hits     = 0  (nothing is requested twice)

After 15 requests

Buffers  [0] [1] [2] [3] [4]
Contents R10 R11 R12 R13 R14

(b) sequential scan, b=10, B=5, repl=MRU

reads = (1st scan) 5 to fill buffer + 5 for next 5 pages
        + (2nd scan) no read for 4 pages, then read for next 6 pages
        [we keep replacing the last buffer page

Mark MRU with *
request R0 [R0*,-,-,-,-]     read
request R1 [R0,R1*,-,-,-]    read
request R2 [R0,R1,R2*,-,-]   read
request R3 [R0,R1,R2,R3*,-]  read
request R4 [R0,R1,R2,R3,R4*] read
request R5 [R0,R1,R2,R3,R5*] read
request R6 [R0,R1,R2,R3,R6*] read
request R7 [R0,R1,R2,R3,R7*] read
request R8 [R0,R1,R2,R3,R8*] read
request R9 [R0,R1,R2,R3,R9*] read
request R0 [R0*,R1,R2,R3,R9] hit
request R1 [R0,R1*,R2,R3,R9] hit
request R2 [R0,R1,R2*,R3,R9] hit
request R3 [R0,R1,R2,R3*,R9] hit
request R4 [R0,R1,R2,R4*,R9] read
request R5 [R0,R1,R2,R5*,R9] read
request R6 [R0,R1,R2,R6*,R9] read
request R7 [R0,R1,R2,R7*,R9] read
request R8 [R0,R1,R2,R8*,R9] read
request R9 [R0,R1,R2,R8,R9*] hit

#requests = 20 (two scans)
#reads    = 15 (see above)
#hits     = 5  (see above)

MRU not great for this request pattern

After 15 requests
```

```
Buffers  [0] [1] [2] [3] [4]
Contents  R0  R1  R2  R4  R9


(c) S Join T, bS=5, bT=10, B=10

for i in 0..4 {
    request S[i]
    for T in 0..9 {
        request T[i]
        join tuples from S[i] and T[j]
    }
}

one request for each page of S
with each page of S, request all pages of T

totasl requests = 5 + 5*10 = 55

Initially

Buffers  [0] [1] [2] [3] [4] [5] [6] [7] [8] [9]
Contents  -   -   -   -   -  -   -   -   -   -

After 5 requests

Buffers  [0] [1] [2] [3] [4] [5] [6] [7] [8] [9]
Contents  S0  T0  T1  T2  T3  -   -   -   -   -

After 10 requests

Buffers  [0] [1] [2] [3] [4] [5] [6] [7] [8] [9]
Contents  S0  T0  T1  T2  T3  T4  T5  T6  T7  T8

After 11 requests (replace MRU buffer[9])

Buffers  [0] [1] [2] [3] [4] [5] [6] [7] [8] [9]
Contents  S0  T0  T1  T2  T3  T4  T5  T6  T7  T9

After 12 requests (replace MRU buffer[9])

Buffers  [0] [1] [2] [3] [4] [5] [6] [7] [8] [9]
Contents  S1  T0  T1  T2  T3  T4  T5  T6  T7  T9

After 15 requests (all required pages are loaded)

Buffers  [0] [1] [2] [3] [4] [5] [6] [7] [8] [9]
Contents  S1  T0  T1  T2  T3  T4  T5  T6  T7  T9
```

```
#requests is easy to work out (see above) = 55
#reads = 5 (for S) + 10 (on first pass over T)
         + 1 (on each subsequent T pass, looking at pattern)
       = 5 + 10 + 1*4 = 19
#hits  = #requests - #hits = 55 - 19 = 36

#requests = 55
#reads    = 19
#hits     = 36
```