Q1

(a)

Random access write takes 1MB/s

Each transaction is 4KB

Can process (1000KB/s)/(4KB)=250 transactions/s

(b)

Random access write takes 170MB/s

Which is 170 times faster than random access write.

Can process 170\*250 transactions/s = 42,500 transactions/s

(c)

Each transaction:

1. Memory access cost 100nm, or 100E-9 s
2. Write speed 25GB/s or 25,000,000KB/s, for a 4KB transaction, it costs 4KB/(25E6 KB/s) = 4/25E-6 s
3. In total, each transaction cost (1E-4) + (4/25E-6) seconds

Take reciprocal, can process 3,846,153.84 transactions/s

(d)

3,846,153.84 / 42,500 = 90.49 servers