

1 (b) (i)

Acks will be sent every 84 ms.

1 (b) (ii)

Acks would be sent every 148 ms.

3 (a) (iii)

Calling a , b the two operands and s the sum of the MSB adder, there is overflow if and only if $ab\bar{s} \vee \bar{a}\bar{b}s$.

3 (a) (iv)

Calling n the sign bit of the MSB ALU, and v the overflow flag, a is less than b if and only if $n\bar{v} \vee \bar{n}v$. This is equivalent to $n \oplus v$.

4 (a)

$$s_p = \frac{1}{1 - u + \frac{u}{s_f}}$$

4 (b)

The required memory speedup is 10 times.

4 (e)

The depth of the cache is 64 k sets. The number of chips used is 24. The net capacity of the cache is 512 kB.