Comparative Architectures (RDM)

(a) Describe briefly six factors which might influence or constrain the design of a new processor. [6 marks]

(b) The performance of a superscalar processor is often enhanced with hardware to support the following:

- branch prediction
- register renaming
- out-of-order execution
- the speculative reordering of load instructions
- strided prefetching

(i) Sketch an assembly language program that would benefit from the use of all of these techniques when executed on a superscalar processor. Briefly describe how each of the techniques helps to improve the performance of your program. [10 marks]

(ii) Briefly outline two example programs for which the adoption of the techniques listed would not provide a significant performance improvement. [4 marks]