

## CSci 330, Fall 2006, Final

Name: \_\_\_\_\_

1. [10 pts] Distinguish between a memory-register instruction set (such as x86) and a load-store instruction set (such as MIPS). What are their relative performance advantages in today's technology?
2. [8 pts] Define the term *pseudo-operation* as used in the context of assembly language programs.
3. [8 pts] Explain what *control hazards* are in the context of pipelining, and describe two techniques to reduce their impact.
4. [8 pts] Even in a single-pipeline processor, executing instructions out of order can sometimes be beneficial. Provide an example of this based on the five-stage MIPS pipeline that we studied in class, and explain how out-of-order execution would help.





14. [8 pts] Breaking a message into many fragments necessitates transmitting many more overall message bits, due to the headers that must accompany each fragment. Thus, one might think that networks would work better with very large maximum frame sizes, so long messages can be broken into fewer frames. Why, then, do real networks impose a relatively restrictive maximum frame size (like Ethernet's limit of 1,500 bytes per frame)?
  
15. [8 pts] In the original ALOHA system (the predecessor to the Ethernet protocol), each station would commence sending a message as soon as a program requested that it be sent. A proposal called "slotted ALOHA" was made for improving it. Explain this alternative system and why it makes a better use of the bandwidth.
  
16. [8 pts] Describe the link state protocol for routing table updates. (This is roughly the protocol used within the Internet today.)
  
17. [8 pts] In quantum computing, there are two categories of operations that one can apply to a single qubit — unitary transformations and measurement. Choose one of these, and describe what it does.

*Have a happy and safe holiday break!*