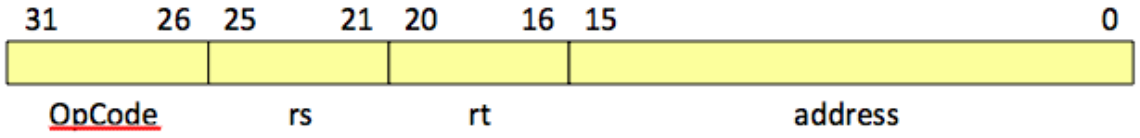
# CMPUT 229 - Quiz # 3 - Winter 2012

Name:

**Question 1 (100 points):** MIPS-LRF is a MIPS instruction-set architecture with a large register file. MIPS-LRF has 128 registers and the instruction formats have to accommodate this change. Consider a branch instruction. Assume that the instruction still has to be 32-bits long and that any changes made to the instruction format only increase/decrease the size of the immediate field. Recall that in the original MIPS architecture, the branch instruction uses the following format:




a. (**20 points**) How many bits are available for the immediate bit field for a branch instruction in MIPS-LRF?

b. (**20 points**) How does the range of branch in MIPS-LRF compares with the range of a branch in the original MIPS architecture?

c. **60 points**) Assume that in a program that uses MIPS-LRF the current PC address is `0x 0000 0000`. How many branches (no jump instructions) are necessary to get to address `0x FFFF E000`? Provide the binary representation for the immediate field for the branch(es) instruction(s) required.