University of Illinois at Urbana-Champaign
First Midterm Exam, ECE 220 Honors Section

Thursday 15 February 2018

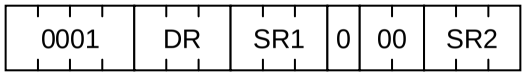
Name:
Net ID:

- **Be sure that your exam booklet has ELEVEN pages.**
- **Write your name and Net ID on the first page.**
- **Do not tear the exam apart other than to remove the reference sheet.**
- **This is a closed book exam. You may <u>not</u> use a calculator.**
- **You are allowed one handwritten 8.5×11-inch sheet of notes (both sides).**
- **The last page of the exam gives RTL for LC-3 instructions (except JSRR). Copies of Patt & Patel's Appendix A are also available during the exam.**
- **Absolutely no interaction between students is allowed.**
- **Show all work, and clearly indicate any assumptions that you make.**
- **Don't panic, and good luck!**

Problem 1	24 points	_____
Problem 2	20 points	_____
Problem 3	20 points	_____
Problem 4	16 points	_____
Problem 5	20 points	_____
Total	100 points	_____

NOTES: RTL corresponds to execution (after fetch!); JSRR not shown

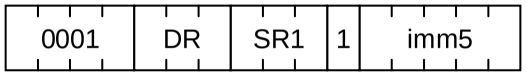
ADD



ADD DR, SR1, SR2

DR ← SR1 + SR2, Setcc

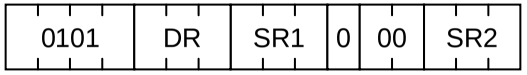
ADD



ADD DR, SR1, *imm5*

DR ← SR1 + SEXT(imm5), Setcc

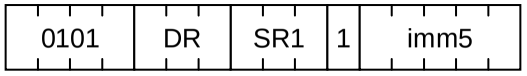
AND



AND DR, SR1, SR2

DR ← SR1 AND SR2, Setcc

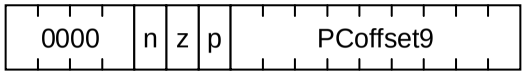
AND



AND DR, SR1, *imm5*

DR ← SR1 AND SEXT(imm5), Setcc

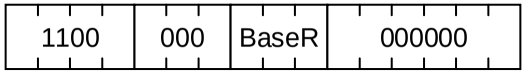
BR



BR{nzp} *PCoffset9*

((n AND N) OR (z AND Z) OR (p AND P)):
PC ← PC + SEXT(PCoffset9)

JMP



JMP BaseR

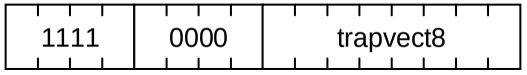
PC ← BaseR

JSR

JSR *PCoffset11*

R7 ← PC, PC ← PC + SEXT(PCoffset11)

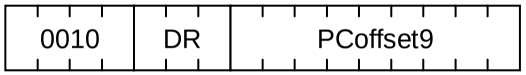
TRAP



TRAP *trapvect8*

R7 ← PC, PC ← M[ZEXT(trapvect8)]

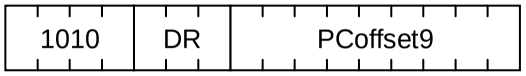
LD



LD DR, *PCoffset9*

DR ← M[PC + SEXT(PCoffset9)], Setcc

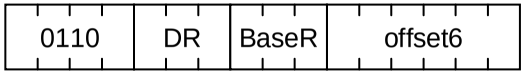
LDI



LDI DR, *PCoffset9*

DR ← M[M[PC + SEXT(PCoffset9)]], Setcc

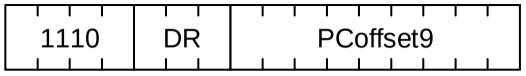
LDR



LDR DR, BaseR, *offset6*

DR ← M[BaseR + SEXT(offset6)], Setcc

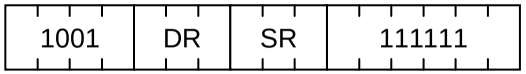
LEA



LEA DR, *PCoffset9*

DR ← PC + SEXT(PCoffset9), Setcc

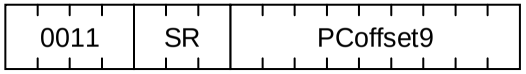
NOT



NOT DR, SR

DR ← NOT SR, Setcc

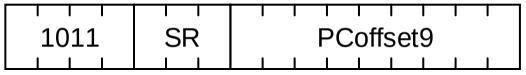
ST



ST SR, *PCoffset9*

M[PC + SEXT(PCoffset9)] ← SR

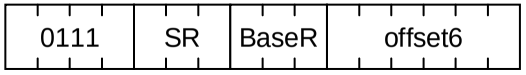
STI



STI SR, *PCoffset9*

M[M[PC + SEXT(PCoffset9)]] ← SR

STR



STR SR, BaseR, *offset6*

M[BaseR + SEXT(offset6)] ← SR