AND R5, R2, #-2

```
MAR       <- PC                                                    # LD.MAR, GatePC
MDR       <- Mem[MAR]; PC <- PC + 1                                # LD.MDR, MDR.SEL, MEM.EN, LD.PC, PCMUX
IR        <- MDR                                                   # LD.IR, GATEMDR
Reg[5]    <- Reg[2] & Sext(IR[4:0]); CC <- Sign(Reg[2] & Sext(IR[4:0]))    # LD.REG, DR = 5, GATEALU, ALUK = &, SR1 = 2, SR2MUX, LD.CC
```

BRnp SubR

LC3Viz has a bug: it uses IR[10:0] instead of IR[8:0]. The correct one is IR[8:0].

```
MAR       <- PC                                                    # LD.MAR, GatePC
MDR       <- Mem[MAR]; PC <- PC + 1                                # LD.MDR, MDR.SEL, MEM.EN, LD.PC, PCMUX
IR        <- MDR                                                   # LD.IR, GATEMDR
PC        <- PC + ((CC == N || CC == P) ? Sext(IR[8:0]) : 0)       # LD.PC, PCMUX, ADDR1MUX, ADDR2MUX
```

LEA R1, Var

```
MAR       <- PC                                                    # LD.MAR, GatePC
MDR       <- Mem[MAR]; PC <- PC + 1                                # LD.MDR, MDR.SEL, MEM.EN, LD.PC, PCMUX
IR        <- MDR                                                   # LD.IR, GATEMDR
Reg[1]    <- PC + Sext(IR[8:0]); CC <- Sign(PC + Sext(IR[8:0]))    # LD.REG, DR = 1, GATEMARMUX, MARMUX, ADDR1MUX, ADDR2MUX, LD.CC
```

STR R1, R6, #3

```
MAR       <- PC                                                    # LD.MAR, GatePC
MDR       <- Mem[MAR]; PC <- PC + 1                                # LD.MDR, MDR.SEL, MEM.EN, LD.PC, PCMUX
IR        <- MDR                                                   # LD.IR, GATEMDR
MAR       <- Reg[6] + Sext(IR[5:0])                                # LD.MAR, GATEMARMUX, MARMUX, ADDR1MUX, SR1 = 6, ADDR2MUX
MDR       <- Reg[1] + 0                                            # LD.MDR, MDR.SEL, GATEMARMUX, MARMUX, ADDR1MUX, SR1 = 1, ADDR2MUX
Mem[MAR] <- MDR                                                    # MEM.EN, MEM.RW
```

STI R4, Dest

```
MAR       <- PC                                                    # LD.MAR, GatePC
MDR       <- Mem[MAR]; PC <- PC + 1                                # LD.MDR, MDR.SEL, MEM.EN, LD.PC, PCMUX
IR        <- MDR                                                   # LD.IR, GATEMDR
MAR       <- PC + Sext(IR[8:0])                                    # LD.MAR, GATEMARMUX, MARMUX, ADDR1MUX, ADDR2MUX
MDR       <- Mem[MAR]                                              # LD.MDR, MDR.SEL, MEM.EN
MAR       <- MDR                                                   # LD.MAR, GATEMDR
MDR       <- Reg[4] + 0                                            # LD.MDR, MDR.SEL, GATEMARMUX, MARMUX, ADDR1MUX, SR = 4, ADDR2MUX
Mem[MAR] <- MDR                                                    # MEM.EN, MEM.RW
```