Program 1:

```
set #2
lrm r1, #7
set #0
lrm r1, #3
set #2
lrm r2, #5
lsa r1, r2
lrm r0, #0
lsa r0, r1
set #0
lsa r4, #0
lsa r2, #1
lsa r3, #2
set #1
bor r2
set #3
lrm r3
set #2
lrm r1, #3
lsa r0, r1
lrm r3, #0
lrm r6, #0
FOR1:
set #2
lsa r3, r6
bor END1
lrm r1, #2
set #0
lrm r1, #4
snxa r1, r1
rxor r2, r1
lrm r2, #7
bor r1, r2
set #1
lsa r1, #0
snxa r0, r0
set #2
lrm r2, #1
lsa r0, r2
lsa r3, r2
lrm r6, #0
lsa r6, r3
lrm r3, #0
```

```
set #3
bor FOR1
END1:
set #2
lrm r3, #0
lrm r6, #0
lrm r4, #3
lrm r2, #1
set #0
lrm r4, #4
set #2
lsa r4, r2
FOR2:
set #2
lsa r3, r6
bor END2
lrm r5, #0
lsa r5, r0
lrm r0, #0
lsa r0, r3
set #0
lsa r1, #0
snxa r1, r1
rxor r2, r1
lrm r2, #7
bor r1, r2
set #2
lrm r0, #0
lsa r0, r5
set #1
lsa r1, #0
snxa r0, r0
set #2
lrm r2, #1
lsa r0, r2
lsa r3, r2
lrm r6, #0
lsa r6, r3
lrm r3, #0
set #3
bor FOR2
END2:
DONE
```

Program 2:

```
set #2
lrm r1, #0
lrm r0, #4
lrm r6, #4
lrm r2, #3
set #0
lrm r0, #4
lrm r6, #3
set #2
lsa r0, r2
lsa r0, r2
lsa r0, r2
set #0
lsa r4, #0
set #2
snxa r4, r6
ISRIGHTTAP:
set #2
rxor r2, r1
lrm r3, #0
lsa r3, r2
lrm r5, #1
lsa r1, r5
set #3
bor ISRIGHTTAP
set #2
lrm r5, #2
lrm r0, #4
lrm r4, #1
set #3
lsa r1, r4
set #0
lrm r5, #4
lrm r0, #4
lsa r4, #0
set #2
snxa r5, r4
set #3
lrm r5
set #1
bor r1
set #2
lrm r2, #0
```

```
lrm r4, #4
lrm r7, #1
set #0
lrm r4, #4
WHILECOUNTER:
set #2
lrm r3, #0
lsa r3, r2
bor ENDP2
set #2
lrm r0, #0
lsa r0, r4
lsa r0, r2
set #0
lsa r3, #0
snxa r3, r3
set #2
lrm r0, #0
lsa r0, r2
set #1
lsa r3, #0
snxa r5, r5
set #2
lsa r2, r7
lrm r3, #0
set #3
bor WHILECOUNTER
ENDP2:
DONE
```

Program 3:

```
set #2
lrm r1, #0
lrm r0, #4
lrm r6, #4
lrm r2, #3
set #0
lrm r0, #4
lrm r6, #3
set #2
lsa r0, r2
lsa r0, r2
lsa r0, r2
```

```
set #0
lsa r4, #0
set #2
snxa r4, r6
ISRIGHTTAP:
set #2
rxor r2, r1
lrm r3, #0
lsa r3, r2
lrm r5, #1
lsa r1, r5
set #3
bor ISRIGHTTAP
set #2
lrm r5, #2
lrm r0, #4
lrm r4, #1
set #3
lsa r1, r4
set #0
lrm r5, #4
lrm r0, #4
lsa r4, #0
set #2
snxa r5, r4
set #3
lrm r5
set #1
bor r1
set #2
lrm r2, #0
lrm r4, #4
lrm r7, #1
set #0
lrm r4, #4
set #2
lrm r6, #0
lsa r6, r4
lrm r5, #4
set #0
lrm r5, #5
WHILECOUNTER:
set #2
lrm r3, #0
```

```
lsa r3, r2
bor ENDP2
set #2
lrm r0, #0
lsa r0, r4
lsa r0, r2
set #0
lsa r3, #0
rxor r4, r3
set #1
lrm r3, #7
rxor GOOD
set #2
lrm r3, #0
lsa r3, r5
STORE:
set #2
lrm r0, #0
lsa r0, r2
set #1
lsa r3, #0
snxa r5, r5
set #2
lsa r2, r7
lrm r3, #0
lrm r4, #0
lsa r4, r6
set #3
bor WHILECOUNTER
ENDP2:
set #2
lrm r3, #0
lrm r4, #0
bor AFTERALEXIS
GOOD:
set #0
lsa r3, #0
snxa r3, r3
set #2
lrm r4, #0
lsa r4, r3
set #1
rxor STORE
AFTERALEXIS:
```

```
set #2
lrm r5, #0
lrm r4, #4
set #0
lrm r4, #3
COUNTSPACES:
set #2
lrm r0, #0
lsa r0, r5
set #0
lsa r3, #0
set #2
lrm r7, #1
lsa r5, r7
set #1
rxor COUNTSPACES
set #2
lrm r2, #0
set #3
lsa r5, r7

SHIFTOVERSPACES:
set #2
lrm r3, #0
lsa r3, r2
lrm r0, #0
lsa r0, r5
lrm r4, #4
set #0
lrm r4, #4
set #3
lsa r4, r0
set #2
bor SHIFTNEXT
lrm r0, #0
lsa r0, r2
lsa r0, r5
set #0
lsa r1, #0
set #2
lrm r0, #0
lsa r0, r2
set #1
lsa r1, #0
```

```
set #2
lsa r2, r7
lrm r3, #0
lrm r4, #0
bor SHIFTOVERSPACES
SHIFTNEXT:
set #2
lrm r3, #0
lsa r3, r2
lrm r4, #4
set #0
lrm r4, #4
set #2
bor FINALLYY
lrm r0, #0
lsa r0, r2
lrm r5, #4
set #0
lrm r5, #3
set #1
lsa r5, #0
set #2
lsa r2, r7
lrm r3, #0
lrm r4, #0
bor SHIFTNEXT
FINALLYY:
DONE
```