# ICS Lab5 Report<\center>

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## Part_1:寄存器功能介绍

R0：输入待判断的数
R1：存储判断函数结果
R2：存储循环变量i
R3、R6:中间变量寄存器
R4：存储R0 mod (i*i) 的结果
R5:存储（根号R0下取整）的负数
R7：JSR返回地址

## Part_2:设计思路

①设计Mod函数及求解R5的GETSQn函数
②利用两者搭建具体循环判断模块

## Part_3：模块展示

### Ⅰ）主模块

```
JSR JUDGE ;
HALT
JUDGE  ; TO BE DONE
ST R7,TemPC;//暂存R7
JSR GETSQn;
ADD R1,R1,#1;
ADD R2,R2,#1;
LOOP3 ADD R2,R2,#1;//R2=i
ADD R3,R2,R5;//R5存负(根号n的下取整)
BRp LOOP1;
JSR MOD;
ADD R4,R4,#0;//查看模数是否为0
BRz LOOP2;
BRnp LOOP3;
LOOP2 ADD R1, R1, #-1;
LOOP1 LD R7,TemPC;
TemPC;
RET;
```

### Ⅱ）GETSQn 函数（求解R5）

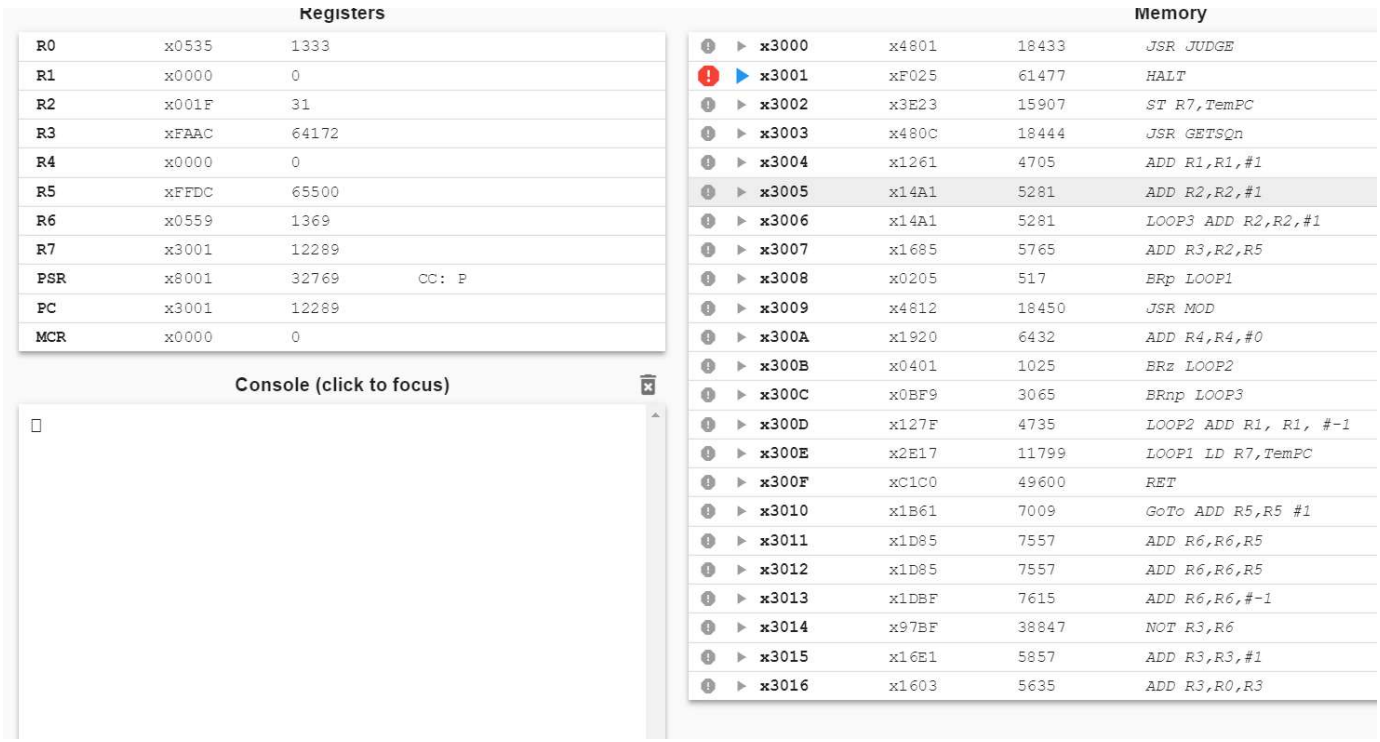
```
GETSQn ;
GoTo ADD R5,R5 #1;
ADD R6,R6,R5;
ADD R6,R6,R5;
ADD R6,R6,#-1;//R6=R5*R5;
NOT R3,R6;
ADD R3,R3,#1;
ADD R3,R0,R3;//比较-R6与R0大小
BRzp GoTo;
ADD R5,R5,#-1;
NOT R5,R5;
ADD R5,R5,#1;
RET ;
```

### Ⅲ）Mod 函数（求解R4）

```
MOD ;//求R0 mod R2 的值，存入R4;
NOT R2, R2;
ADD R2, R2, #1;
AND R3, R3, #0;
GoTo1 ADD R3, R3, R2;
ADD R4, R3, R0;
BRzp GoTo1;//循环加-i，直到恰好大于R0
NOT R2, R2;
ADD R2, R2, #1;
ADD R4, R4, R2;//加i，让模数处于0~（i-1）间
RET;
;
```

# Part_4:结果展示

## ①R0=1333=31*43



Registers

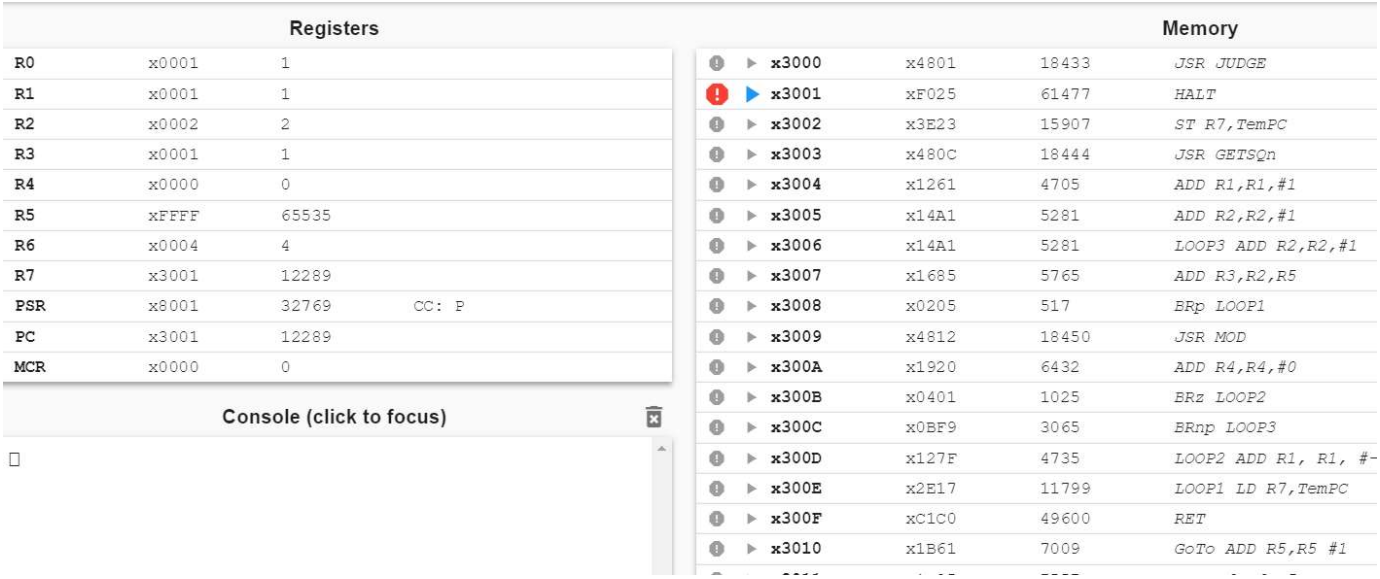
| | | | |
|---|---|---|---|
| R0 | x0535 | 1333 | |
| R1 | x0000 | 0 | |
| R2 | x001F | 31 | |
| R3 | xFAAC | 64172 | |
| R4 | x0000 | 0 | |
| R5 | xFFDC | 65500 | |
| R6 | x0559 | 1369 | |
| R7 | x3001 | 12289 | |
| PSR | x8001 | 32769 | CC: P |
| PC | x3001 | 12289 | |
| MCR | x0000 | 0 | |

Console (click to focus)

Memory

| | | | |
|---|---|---|---|
| x3000 | x4801 | 18433 | JSR JUDGE |
| x3001 | xF025 | 61477 | HALT |
| x3002 | x3E23 | 15907 | ST R7,TemPC |
| x3003 | x480C | 18444 | JSR GETSQn |
| x3004 | x1261 | 4705 | ADD R1,R1,#1 |
| x3005 | x14A1 | 5281 | ADD R2,R2,#1 |
| x3006 | x14A1 | 5281 | LOOP3 ADD R2,R2,#1 |
| x3007 | x1685 | 5765 | ADD R3,R2,R5 |
| x3008 | x0205 | 517 | BRp LOOP1 |
| x3009 | x4812 | 18450 | JSR MOD |
| x300A | x1920 | 6432 | ADD R4,R4,#0 |
| x300B | x0401 | 1025 | BRz LOOP2 |
| x300C | x0BF9 | 3065 | BRnp LOOP3 |
| x300D | x127F | 4735 | LOOP2 ADD R1, R1, #-1 |
| x300E | x2E17 | 11799 | LOOP1 LD R7,TemPC |
| x300F | xC1C0 | 49600 | RET |
| x3010 | x1B61 | 7009 | GoTo ADD R5,R5 #1 |
| x3011 | x1D85 | 7557 | ADD R6,R6,R5 |
| x3012 | x1D85 | 7557 | ADD R6,R6,R5 |
| x3013 | x1DBF | 7615 | ADD R6,R6,#-1 |
| x3014 | x97BF | 38847 | NOT R3,R6 |
| x3015 | x16E1 | 5857 | ADD R3,R3,#1 |
| x3016 | x1603 | 5635 | ADD R3,R0,R3 |

## ②R0=1



Registers

| | | | |
|---|---|---|---|
| R0 | x0001 | 1 | |
| R1 | x0001 | 1 | |
| R2 | x0002 | 2 | |
| R3 | x0001 | 1 | |
| R4 | x0000 | 0 | |
| R5 | xFFFF | 65535 | |
| R6 | x0004 | 4 | |
| R7 | x3001 | 12289 | |
| PSR | x8001 | 32769 | CC: P |
| PC | x3001 | 12289 | |
| MCR | x0000 | 0 | |

Console (click to focus)

Memory

| | | | |
|---|---|---|---|
| x3000 | x4801 | 18433 | JSR JUDGE |
| x3001 | xF025 | 61477 | HALT |
| x3002 | x3E23 | 15907 | ST R7,TemPC |
| x3003 | x480C | 18444 | JSR GETSQn |
| x3004 | x1261 | 4705 | ADD R1,R1,#1 |
| x3005 | x14A1 | 5281 | ADD R2,R2,#1 |
| x3006 | x14A1 | 5281 | LOOP3 ADD R2,R2,#1 |
| x3007 | x1685 | 5765 | ADD R3,R2,R5 |
| x3008 | x0205 | 517 | BRp LOOP1 |
| x3009 | x4812 | 18450 | JSR MOD |
| x300A | x1920 | 6432 | ADD R4,R4,#0 |
| x300B | x0401 | 1025 | BRz LOOP2 |
| x300C | x0BF9 | 3065 | BRnp LOOP3 |
| x300D | x127F | 4735 | LOOP2 ADD R1, R1, #- |
| x300E | x2E17 | 11799 | LOOP1 LD R7,TemPC |
| x300F | xC1C0 | 49600 | RET |
| x3010 | x1B61 | 7009 | GoTo ADD R5,R5 #1 |

## ③R0=199

## Registers

| | | | |
|---|---|---|---|
| R0 | x00C7 | 199 | |
| R1 | x0001 | 1 | |
| R2 | x000F | 15 | |
| R3 | x0001 | 1 | |
| R4 | x0003 | 3 | |
| R5 | xFFF2 | 65522 | |
| R6 | x00E1 | 225 | |
| R7 | x3001 | 12289 | |
| PSR | x8001 | 32769 | CC: P |
| PC | x3001 | 12289 | |
| MCR | x0000 | 0 | |

## Console (click to focus)

## Memory

| | | | | |
|---|---|---|---|---|
| | x3000 | x4801 | 18433 | *JSR JUDGE* |
| ! | x3001 | xF025 | 61477 | *HALT* |
| | x3002 | x3E23 | 15907 | *ST R7,TemPC* |
| | x3003 | x480C | 18444 | *JSR GETSQn* |
| | x3004 | x1261 | 4705 | *ADD R1,R1,#1* |
| | x3005 | x14A1 | 5281 | *ADD R2,R2,#1* |
| | x3006 | x14A1 | 5281 | *LOOP3 ADD R2,R2,#1* |
| | x3007 | x1685 | 5765 | *ADD R3,R2,R5* |
| | x3008 | x0205 | 517 | *BRp LOOP1* |
| | x3009 | x4812 | 18450 | *JSR MOD* |
| | x300A | x1920 | 6432 | *ADD R4,R4,#0* |
| | x300B | x0401 | 1025 | *BRz LOOP2* |
| | x300C | x0BF9 | 3065 | *BRnp LOOP3* |
| | x300D | x127F | 4735 | *LOOP2 ADD R1, R1, #-1* |
| | x300E | x2E17 | 11799 | *LOOP1 LD R7,TemPC* |
| | x300F | xC1C0 | 49600 | *RET* |