Fundamente de ingineria calculatoarelor

Laborator 3

1. Little Man Computer: Multiplication

```
      INP
      STA num1
      INP
      STA num2
loop  LDA total
      ADD num1
      STA total
      LDA num2
      SUB one
      STA num2
      BRP loop
      LDA total
      SUB num1
      STA total
      OUT
      HLT
num1  DAT
num2  DAT
total DAT 0
one   DAT 1
```

2. Little Man Computer: Division

```
      INP
      STA num1
      INP
      STA num2
loop  LDA num2
      SUB num1
      BRZ end2
      BRP end
      LDA num1
      SUB num2
      STA num1
      LDA count
      ADD one
      STA count
      BRA loop
end   LDA count
      OUT
      HLT
End2  LDA count
      ADD one
      OUT
      HLT
num1  DAT
num2  DAT
count DAT 0
one   DAT 1
```

3. Little Man Computer: Alarm System

```
START     INP
          SUB PINCODE
          BRZ DEACTIVATE
          LDA WRONGCODE
          OUT
          LDA COUNTER
          SUB ONE
          STA COUNTER
          BRP START
          BRA ALARM
          HLT
DEACTIVATE LDA TRUE
          OUT
          HLT
ALARM     LDA FALSE
          OUT
          HLT
ONE       DAT 1
COUNTER   DAT 2
PINCODE   DAT 123
TRUE      DAT 1
FALSE     DAT -1
WRONGCODE DAT 9
```

4. Little Man Computer: Fibonacci

F0 = 0 and F1 = 1.
Fn = Fn-1 + Fn-2

```
INP
STA x
INP
STA y
INP
STA   lmt
LDA x
OUT
LDA y
OUT
loop    LDA lmt
BRZ end
SUB one
STA lmt
LDA x
ADD y
STA z
OUT
LDA y
STA x
LDA z
STA y
BRA loop
end   LDA z
INP
STA num
INP
STA power
SUB one
STA power
loop LDA power
    BRZ end
    SUB one
    STA power
    LDA num
    ADD num
    STA num
    BRP loop

end LDA num
   OUT
   SUB num
   STA num
   HLT

num DAT
power DAT
one DAT 1
SUB z
HLT
x    DAT
y    DAT
z    DAT
lmt   DAT
one   DAT 1
```

5. Little Man Computer: Power of two

```
      INP
      STA F0
      INP
      STA F1
      INP
      STA n
loop    LDA n
      BRZ finish
      SUB one
      STA n
      LDA F0
      ADD F1
      STA FN
      OUT
      LDA F1
      STA F0
      LDA FN
      STA F1
      BRA loop
finish  LDA FN
      SUB FN
      HLT
F0     DAT
F1     DAT
FN     DAT
n      DAT
one    DAT 1
```