FILE:

```
       .st
       OTC PM1
       OTC PM2
       OTC PM3
       INI X
       OTC PM1
       OTC PM2
       OTC PM4
       INI Y
       PSH X
       POP CNT
       PSH ZERO
       POP SUM
LOOP PSH Y
       PSH CNT
       SUB
       JEQ OUT
       PSH CNT
       PSH ONE
       AND
       TSS
       JMP ADJ
       PSH SUM
       PSH CNT
       ADD
       POP SUM
ADJ    PSH CNT
       PSH ONE
       ADD
       POP CNT
       JMP LOOP
OUT    OTI SUM
       HLT
PM1    .dc 031
PM2    .dc 045
PM3    .dc 001
PM4    .dc 002
ZERO   .dw 0
ONE    .dw 1
CNT    .dw 0
SUM    .dw 0
X      .dw 0
Z        .ds 3
Y      .dw 0
       .nd
```

OUTPUT:

```
Line 0: is a single assembler directive
Line 1: OTC is an operation with a VALID operand. Opcode: 01111
Line 2: OTC is an operation with a VALID operand. Opcode: 01111
Line 3: OTC is an operation with a VALID operand. Opcode: 01111
Line 4: INI is an operation with a VALID operand. Opcode: 10000
Line 5: OTC is an operation with a VALID operand. Opcode: 01111
Line 6: OTC is an operation with a VALID operand. Opcode: 01111
Line 7: OTC is an operation with a VALID operand. Opcode: 01111
Line 8: INI is an operation with a VALID operand. Opcode: 10000
Line 9: PSH is an operation with a VALID operand. Opcode: 00000
Line 10: POP is an operation with a VALID operand. Opcode: 00001
Line 11: PSH is an operation with a VALID operand. Opcode: 00000
Line 12: POP is an operation with a VALID operand. Opcode: 00001
```

```
Line 13: is a label followed by PSH with a VALID operand. Opcode: 00000
Line 14: PSH is an operation with a VALID operand. Opcode: 00000
Line 15: SUB is an operation that does not need an operand. Opcode: 00011
Line 16: JEQ is an operation with a VALID operand. Opcode: 01011
Line 17: PSH is an operation with a VALID operand. Opcode: 00000
Line 18: PSH is an operation with a VALID operand. Opcode: 00000
Line 19: AND is an operation that does not need an operand. Opcode: 00100
Line 20: TSS is an operation that does not need an operand. Opcode: 00111
Line 21: JMP is an operation with a VALID operand. Opcode: 01010
Line 22: PSH is an operation with a VALID operand. Opcode: 00000
Line 23: PSH is an operation with a VALID operand. Opcode: 00000
Line 24: ADD is an operation that does not need an operand. Opcode: 00010
Line 25: POP is an operation with a VALID operand. Opcode: 00001
Line 26: is a label followed by PSH with a VALID operand. Opcode: 00000
Line 27: PSH is an operation with a VALID operand. Opcode: 00000
Line 28: ADD is an operation that does not need an operand. Opcode: 00010
Line 29: POP is an operation with a VALID operand. Opcode: 00001
Line 30: JMP is an operation with a VALID operand. Opcode: 01010
Line 31: is a label followed by OTI with a VALID operand. Opcode: 10001
Line 32: HLT is an operation that does not need an operand. Opcode: 11111
Line 33: is a label, followed by an assembler directive, followed by data value
000000011001
Line 34: is a label, followed by an assembler directive, followed by data value
000000100101
Line 35: is a label, followed by an assembler directive, followed by data value
000000000001
Line 36: is a label, followed by an assembler directive, followed by data value
000000000010
Line 37: is a label, followed by an assembler directive, followed by data value
000000000000
Line 38: is a label, followed by an assembler directive, followed by data value
000000000001
Line 39: is a label, followed by an assembler directive, followed by data value
000000000000
Line 40: is a label, followed by an assembler directive, followed by data value
000000000000
Line 41: is a label, followed by an assembler directive, followed by data value
000000000000
Line 42: is a label, followed by an assembler directive, followed by data value
000000000000
Line 43: is a label, followed by an assembler directive, followed by data value
000000000000
Line 44: is a single assembler directive

-------UNDEFINED TABLE--------
|   LABEL   |  LINE NUMBERS  |
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-------MULTIPLY DEFINED--------
|   LABEL   |  LINES REFERENCED  |
------------------------------
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-------SYMBOL TABLE--------
|   LABEL   |    ADDRESS  |
---------------------------
|    PM1    |    0100000 |
|    PM2    |    0100001 |
|    PM3    |    0100010 |
|      X    |    0101000 |
|    PM4    |    0100011 |
|      Y    |    0101100 |
|    CNT    |    0100110 |
```

```
|   ZERO    |    0100100 |
|    SUM    |    0100111 |
|   LOOP    |    0001100 |
|    OUT    |    0011110 |
|    ONE    |    0100101 |
|    ADJ    |    0011001 |
|     Z          |    0101001 |
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FIRST PASS:
------------MACHINE CODE-------------
-------------------------------------
|        01111 |           OTC PM1

|        01111 |           OTC PM2

|        01111 |           OTC PM3

|        10000 |             INI X

|        01111 |           OTC PM1

|        01111 |           OTC PM2

|        01111 |           OTC PM4

|        10000 |             INI Y

|        00000 |             PSH X

|        00001 |           POP CNT

|        00000 |          PSH ZERO

|        00001 |           POP SUM

|        00000 |        LOOP PSH Y

|        00000 |           PSH CNT

| 000110000000 |               SUB

|        01011 |           JEQ OUT

|        00000 |           PSH CNT

|        00000 |           PSH ONE

| 001000000000 |               AND

| 001110000000 |               TSS

|        01010 |           JMP ADJ

|        00000 |           PSH SUM

|        00000 |           PSH CNT

| 000100000000 |               ADD

|        00001 |           POP SUM

|        00000 |    ADJ    PSH CNT

|        00000 |           PSH ONE
```

```
| 000100000000 |               ADD
|        00001 |           POP CNT
|        01010 |          JMP LOOP
|        10001 |    OUT    OTI SUM
| 111110000000 |               HLT
| 000000011001 |    PM1    .dc 031
| 000000100101 |    PM2    .dc 045
| 000000000001 |    PM3    .dc 001
| 000000000010 |    PM4    .dc 002
| 000000000000 |      ZERO   .dw 0
| 000000000001 |      ONE    .dw 1
| 000000000000 |      CNT    .dw 0
| 000000000000 |      SUM    .dw 0
| 000000000000 |      X      .dw 0
| 000000000000 |        Z     .ds 3
| 000000000000 |
| 000000000000 |
| 000000000000 |      Y      .dw 0
--------------------------------------
SECOND PASS:
------------MACHINE CODE-------------
--------------------------------------
| 011110100000 |           OTC PM1
| 011110100001 |           OTC PM2
| 011110100010 |           OTC PM3
| 100000101000 |             INI X
| 011110100000 |           OTC PM1
| 011110100001 |           OTC PM2
| 011110100011 |           OTC PM4
| 100000101100 |             INI Y
| 000000101000 |             PSH X
| 000010100110 |           POP CNT
| 000000100100 |          PSH ZERO
| 000010100111 |           POP SUM
```

```
| 000000101100 |        LOOP PSH Y
| 000000100110 |           PSH CNT
| 000110000000 |               SUB
| 010110011110 |           JEQ OUT
| 000000100110 |           PSH CNT
| 000000100101 |           PSH ONE
| 001000000000 |               AND
| 001110000000 |               TSS
| 010100011001 |           JMP ADJ
| 000000100111 |           PSH SUM
| 000000100110 |           PSH CNT
| 000100000000 |               ADD
| 000010100111 |           POP SUM
| 000000100110 |    ADJ    PSH CNT
| 000000100101 |           PSH ONE
| 000100000000 |               ADD
| 000010100110 |           POP CNT
| 010100001100 |          JMP LOOP
| 100010100111 |    OUT    OTI SUM
| 111110000000 |               HLT
| 000000011001 |    PM1    .dc 031
| 000000100101 |    PM2    .dc 045
| 000000000001 |    PM3    .dc 001
| 000000000010 |    PM4    .dc 002
| 000000000000 |      ZERO   .dw 0
| 000000000001 |      ONE    .dw 1
| 000000000000 |      CNT    .dw 0
| 000000000000 |      SUM    .dw 0
| 000000000000 |      X      .dw 0
| 000000000000 |        Z     .ds 3
| 000000000000 |
| 000000000000 |
```

```
| 000000000000 |      Y      .dw 0
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No error detected in program. Outputing to file.
```