**Machine Language Homework – 2/9/17**

**Exercise 1 - Hack Assembly and Hack Machine:**

* Set D to A-1 D=A-1 1110 1100 1001 0000
* Set both A and D to A+1 AD=A+1 1110 1101 1111 0000
* Set D to 19 @19 0000 0000 0001 0011

D=A 1110 1100 0000 0000

* Set both A and D to A+D AD=A+D 1110 0000 1011 0000
* Set RAM[5034] to D-1 @5034 0001 0011 1010 1010

M=D-1 1110 0011 1000 1000

* Set RAM[53] to 171 @171 0000 0000 1010 1011

D=A 1110 1100 0001 0000

@53 0000 0000 0011 0101

M=D 1111 0011 0000 1000

* Add 1 to RAM[7], @7 0000 0000 0000 0111

and store the result in D MD=M+1 1111 1101 1101 1001

**Exercise 2 – High Level Code – Hack Assembly:**

* Sum = 0 @4500

M=0

* j = j + 1 @3012

M=M+1

* q = sum + 12 – j @12

D=A

@3012

D=D-M

@4500

D=D+M

@3812

M=D

* arr[3] = -1 @3

D=M

@20561

A=A+D

M=-1

* arr[j] = 0 @3012

D=M

@20561

A=A+D

M=0

* arr[j] = 17 @3012

D=M

@20561

A=A+D

@17

M=A

**Exercise 3 – Psuedo Code – Hack Assembly:**

* goto 50 @50 // @END

0;JMP

* if (D == 0) goto 112 @112

D;JEQ

* if (D < 9) goto 507 @9

D=D-A

@507

D;JLT

* if (RAM[12] > 0 ) goto 50 @12

D=M

@50 // @END

D;JGT

* if (sum > 0) goto END @2200 // sum

D=M // D = sum

@50 // @END

M;JGT

* if (x[i] <= 0) goto NEXT @15 // i

D=M // D = i

@4000 // x

D=D+M

@120 // @NEXT

D;JLE