

Student Name: _____ Student ID: _____

Problem 1

Short answer questions.

Write the equivalent C code for the assembly below.

```

                clr    J,X
go_back:        ldaa   J,X
                cmpa  #$64
                bhs   done
                jsr   do_it
                inc   J,X
                bra   go_back
done:           .
                .
                .
```

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Problem 2 Draw the state graph on the next page for the code below. The code is for a vending machine and there are only two inputs D (dime inserted) and N (nickel inserted). The outputs on port B are bits 1 and 0 and are “drop the drink” and “provide change” respectively. **How much does the beverage cost?** Hint: This is a Mealy machine.

```

OUTN    EQU 0
OUTD    EQU 1
NSN     EQU 2
NSD     EQU 4
        ORG EEPROM
STATE   ds.w 1
ST0     dc.b %00000000
        dc.b %00000000
        dc.w ST5
        dc.w ST10
ST5     dc.b %00000000
        dc.b %00000000
        dc.w ST10
        dc.w ST15
ST10    dc.b %00000000
        dc.b %00000000
        dc.w ST15
        dc.w ST20
ST15    dc.b %00000000
        dc.b %00000010
        dc.w ST20
        dc.w ST0
ST20    dc.b %00000010
        dc.b %00000011
        dc.w ST0
        dc.w ST0
    
```

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Problem 2 (cont)

```
ISR:      ldx  STATE
          ldaa PORTB
          anda #$01           ; check for dime
          beq  Nickel        ; otherwise nickel
Dime:     movb OUTD,X PORTA
          movw NSD,X STATE
          bra  Done
Nickel:   movb OUTN,X PORTA
          movw NSN,X STATE
Done:     rti
```

Draw state graph here.

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Problem 3

Fill in the table. Assume that one 16-bit parameter is passed into the subroutine through the stack and the result (16 bit output parameter) is passed through the stack as well.

; Calling sequence

```

.
leas  - 4, SP
movw  #$5555, 0,SP      ; initialize input parameter here
jsr   do_it
movw  2,SP  OUTPUT     ; store output parameter here
.
.

```

; subroutine

```

INPUT      equ      ? < provide this number>
OUTPUT     equ      ? <provide this number>
do_it:     pshd
           ldd     INPUT,SP
           lsl
           std     OUTPUT,SP
           puld
           rts

```

Location	Just prior to JSR	Just after std	Just after rts
A	12		
B	34		
D			
X	2000		
SP	3BFB		
Mem 3BF5	00		
Mem 3BF6	00		
Mem 3BF7	00		
Mem 3BF8	00		
Mem 3BF9	00		
Mem 3BFA	00		
Mem 3BFB	55		
Mem 3BFC	55		
Mem 3BFD	00		
Mem 3BFE	00		
Mem 3BFF	FF		
Mem 3C00	FF		
Mem 3C01	FF		