

EE 371 Second Semester Test - Thursday October 30, 2003  
30 Points, 16.667% of Final Grade

Please put your name on the outside of the paper also.  
Hand in the test folded so your name shows on the outside.

Name KEY

**The notation used for an asserted low signal is E1\*, i.e. E1-bar.**

1. Insert code to implement the following structured design immediately after each design comment. Assume the following structured design is just a small segment of an overall program.

Assume the following 8-bit two's complement variable data allocations have been made and have been initialized in some other part of the program. (10 points)

```
Temp1:    DS    1
Temp2:    DS    1
; Implement the following design
; IF Temp1 < Temp2
```

```
    Ldaa  Temp1
    cmpa  Temp2
    bge   else
; THEN Temp1 = Temp2
    movb  temp2,temp1
    bra   endif
; ELSE Temp2 = Temp1
else:
    movb  temp1,temp2
endif:
; ENDIF
```

2. An 74LS138 address decoder has the following connections to a 6-bit address bus:  
E1\* = ADR5, E2\* = ADR4, E3 = ADR3, A2 = ADR2, A1 = ADR1, A0 = ADR0

Complete the following table showing what address is present when the output signal is asserted. (4 points)

Output	Address (in Hex)
O0*	08
O1*	09
O2*	0A
O3*	0B
O4*	0C
O5*	0D
O6*	0E
O7*	0F

3. Insert code to implement the following structured design immediately after each design comment. Assume the following structured design is just a small segment of an overall program. Assume the following 8-bit two's unsigned variable data allocations have been made and have been initialized in some other part of the program. (10 points)

```
Temp3:    DS    1
Temp4:    DS    1
Temp5:    DS    1
```

; Implement the following design

; WHILE Temp3 > Temp4

**while\_start:**

**ldaa**  Temp3

**cmpa**  Temp4

**bls**   **enddo**

; DO

; Temp4 = Temp4 + 1

**inc**   Temp4

; Temp5 = 2 \* Temp5

**als**   Temp5

**bra**   **while\_start**

; ENDWHILEDO

**enddo:**

4. Consider the term “Allocate data storage” (6 points)

a. What is meant by this term?

**Reserve a memory location for the storage of variable data in the program.**

b. How is it accomplished in an assembly language program?

**By locating the storage allocation in the correct memory, e.g.**

**ORG DATA**

**and then by reserving sufficient bytes of memory for the variable(s) using the define storage directive, e.g.**

**Count DS 1**

c. Why are variable data storage locations initialized at run time instead of at assembly time?

**Two reasons. First the variable may need to be initialized with a variable value depending on the program, but mostly, because variables are stored in RAM and even though the variable initialization value may be known at assembly time it must be initialized at run time because RAM does not retain its contents when the power is off.**