Points missed: _____ Student's Name: _____

Total score: _____ /100 points

East Tennessee State University
Department of Computer and Information Sciences
CSCI 2150 – Computer Organization
Final Exam for **Sections 201 & 202** in Fall Semester, 2000

Instructor: David Tarnoff

Read this before starting!

- The total possible score for this test is 100 points.
- This test is closed book and closed notes
- You may use a calculator
- **All** answers **must** be placed in space provided. Failure to do so will result in no credit for answer.
- **1 point** will be deducted per answer for missing or incorrect units when required. **No** assumptions will be made for hexadecimal versus decimal, so you should always include the base in your answer.
- If you perform work on the back of a page in this test, indicate that you have done so in case the need arises for partial credit to be determined.

"Fine print"

Academic Misconduct:

ETSU Policy No. 3.13, October 1, 1979:

"All students in attendance at East Tennessee State University are expected to be honorable."

"Academic misconduct will be subject to disciplinary action. Any act of dishonesty in academic work constitutes academic misconduct. This includes plagiarism, the changing or falsifying of any academic documents or materials, cheating, and the giving or receiving of unauthorized aid in tests, examinations, or other assigned school work. Penalties for academic misconduct will vary with the seriousness of the offense and may include, but are not limited to: a grade of "F" on the work in question, a grade of "F" for the course, reprimand, probation, suspension, and expulsion. For a second academic offense, the penalty is permanent expulsion."

1.) If the zero flag (ZF) is set to one, what will the processor do if it encounters the instruction **`JG LABEL`**? (5 points)

a) It will set the instruction pointer so that the next instruction to execute will be at the address LABEL.
b) It will set the instruction pointer so that the next instruction to execute will be the address following the JG instruction.
c) It will set the instruction pointer so that the next instruction to execute will be the address before the JG instruction.
d) It depends on the setting of the sign flag (SF).
e) None of the above

2.) If IP=1435 hex and CS=0407 hex, what is the physical address of the next instruction to execute. (5 points)

3.) If a processor takes 3 cycles to execute any instruction (fetch, decode, execute), then how many cycles would it take to execute 5 instructions if the processor is ***pipelined***? (5 points)

4.) For each of the following assembly language instructions, identify which registers and flags are affected and enter the updated value if you have enough information. (Just put an 'X' in the box if it's impossible to know the new value.) Use the memory contents shown in the chart below if necessary. ***For each instruction, assume all registers contain 0 before execution.***

Offest	+0	+1	+2	+3	+4	+5	+6	+7
DS:1000	A5	5F	4E	F8	74	ED	DA	2D

Instruction	AX	BX	IP	Sign flag	Zero flag	
mov ax,1003h						(3 points)
inc al						(3 points)
jmp 4567h						(3 points)

5.) Name the two reasons covered in class for using segmented addressing in the 80x86. (4 points)

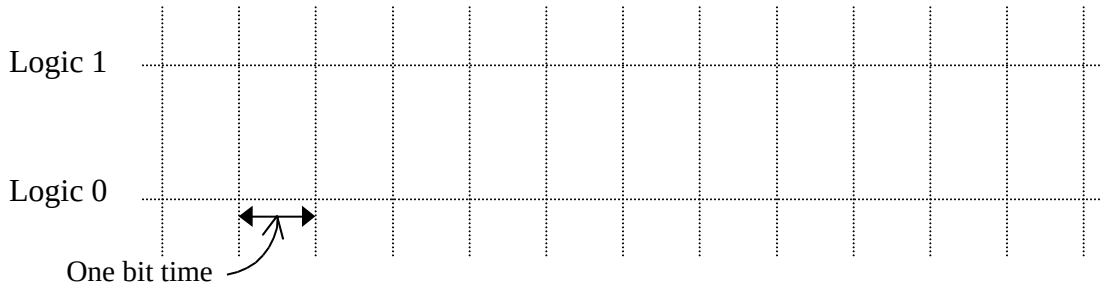
6.) Of the following registers, which are 8 bit registers? (4 points)

a.)	AX	c.)	SP	e.)	CL
b.)	BH	d.)	IP	f.)	DS

7.) Indicate whether the following statements are true or false. (2 points each)

_____ The assembly language instruction CMP does not alter any processor flags
_____ To ***read*** from an ***I/O port***, the ^IORC line is pulsed low.
_____ All Intel 80x86 and Pentium processors can address no more than 64K ports
_____ The newer bi-directional parallel ports have 16 data lines
_____ The 5 input and 5 output control lines of the parallel port ***cannot*** be used for general-purpose applications, i.e., non-printer applications.
_____ The printer port on a PC is interfaced to the processor with memory mapping.
_____ USB allows users to plug and unplug equipment without rebooting.
_____ A null modem is used to connect a DCE device to a DCE device.

8.) Draw the ***entire*** signal that is produced when a serial interface transmits the character ';' with eight-bit data, one stop bit, and odd parity. (ASCII ';' = 3Bh) In addition, identify each part of the signal. (5 points)



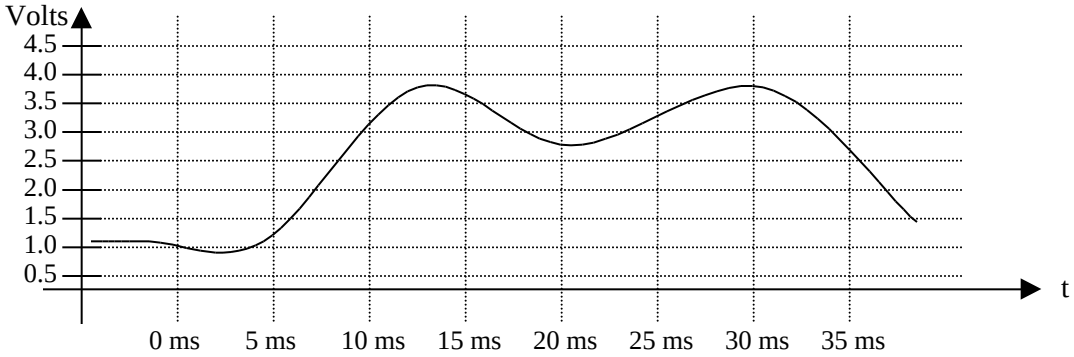
9.) If it takes 2.5 microseconds (1 microsecond = 10^{-6} seconds) to transmit one bit across a serial interface, what is the baud rate? (5 points)

10.) If the baud rate is 9600 bits per second across a link with 1 stop bit, even parity, and 7 data bits, how many data bits per second are being transmitted? (5 points)

11.) Classify each of the following characteristics as RS232 serial (R), USB (U), GPIB (G), or SCSI (S). (2 points each)

_____ Two speeds -- 1.5 Mbps and 12 Mbps
_____ Serial point-to-point communications
_____ Can have up to 127 active devices on a single connection
_____ Can have at most 15 active devices on a single connection
_____ Contains power supply lines in a four conductor connection
_____ Uses voltage levels of -12 volts for a logic 1 and +12 volts for a logic 0
_____ Requires only three conductors for a minimum connection
_____ Primary applications include disk drives, tape drives, and CD drives.

Answer questions 12, 13, and 14 using this figure.



12.) Assuming V_{rl}=0.5 Volts and V_{rh}=4.0 Volts, produce the table of samples output by a three-bit ADC starting at t=0 milliseconds with a sample taken every 5 milliseconds (1 millisecond = 10^{-3} seconds). (5 points)

13.) What would the accuracy (to 4 decimal places) of this system be if we used a 10 bit ADC? (5 points)

14.) What is the highest frequency we could measure with this system? (5 points)

15.) What do the following analog sensors read and what type of output do they have? (8 points)

Sensor	What does it measure?	What does it output?
Linear Variable Displacement Transformer		
Thermister		
Potentiometer		
Thermocouple		

16.) What is the purpose of a Wheatstone bridge? (4 points)