COE 205, Term 101

Computer Organization & Assembly Programming

HW# 1

# What is the ISA (instruction set architecture) of a computer?

# Briefly describe the main functionality of the program counter register (PC), the instruction register (IR), and the fetch-execute process in a computer.

# Describe two advantages for programming in assembly and two advantages for programming in a high-level language.

# Represent the following numbers in binary, octal, and hexadecimal. Use as many bits as needed, and approximate the fraction up to 3 digits:

## 250.375

## 4444.4

# Perform the following arithmetic operations using the designated bases and verify your result by converting the numbers and performing the operation in decimal:

## (10E)16 + (13F)16

## (1E)16 \* (10)16

## (1101)2 \* (1000)2

# Express the following numbers in sign-magnitude, 1`s complement, and 2`s complement notations, assuming 8-bit representation:

## -119

## -55

# Show how the decimal integer -120 would be represented in 2`s complement notation using:

## 8 bits

## 16 bits

# Perform the following operations twice, once for a sign-magnitude notation and once for 2`s complement notation, assuming 4-bit representation of numbers. Indicate in your answer when an overflow occurs:

## 0101 + 1111

## 1011 - 0111

# A microcontroller uses 8-bit registers. Give the following in both binary and decimal:

## The maximum unsigned number that can be stored.

## The smallest (negative) number and the largest (positive) number that can be stored using the sign-magnitude notation.

## The smallest (negative) number and the largest (positive) number that can be stored using the 2`s complement notation.

# If you type the phrase COE205 on your keyboard, what is the binary sequence sent to the computer using 8-bit ASCII with the 8th bit being an even parity bit.

# Translate the following secret message, which has been encoded in ASCII as: 41 74 74 61 63 6B 20 61 74 20 44 61 77 6E.

# Suppose that a byte contains the ASCII code of a decimal digit; that is `0` to `9`. What hex number should be subtracted from the byte to convert it to the numerical form of the characters?