

22C:060: Computer Organization
Spring 2008
Assignment 4
Total points = 50
Assigned March 27, due April 3, 2008, 11:59:59 PM

Instructions to prepare and submit your homework

1. Explain the general plan of the program in Q. 1 using a **readme** file
2. Be generous about using comments to improve readability.
3. To submit, *zip* (or *tar*) all files into a single file, and drop it to ICON drop box

Question 1. (40 points) Create an exponent function: float **exp (float x)** that accepts an input x from the user, and returns e^x , (using the MIPS floating point co-processor). Recall that $e = 2.71828183\dots$. Use *Taylor Series* expansion to compute the exponential function:

$$e^x \approx 1 + x + (x^2)/2! + (x^3)/3! + \dots + (x^{10})/10!$$

(It is an infinite series, but you can stop after computing up to the 10th term)

To facilitate this, you may create two functions, *power* and *factorial*, that may have the signatures: float power (float x, int n) and int factorial (int n). Here, *power* (x ,n) would return x^n for $n \geq 0$ and *factorial* n will return n!.

A helpful SPIM instruction is cvt.s.w Fd Fs that converts an *integer* in the source register Fs to a *single precision floating-point number* in the destination register Fd.

Question 2. (10 points) Let X, Y, Z, be three D-flip-flops, each storing a single bit. Draw a circuit so that by applying a single pulse in the clock line, the following operation can be performed:

if X= 0 **then** Y:= Z **else** Z:= Y

Explain why your circuit will work.