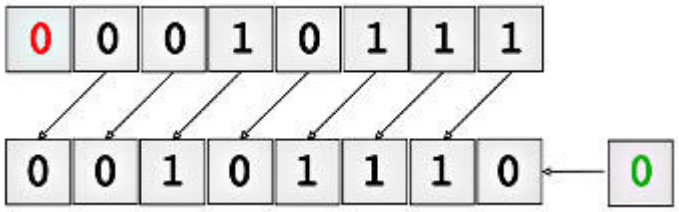
CS 254 PROGRAMMING ASSIGNMENT #2
Multiplication by Shift and Add



Write a program that computes ***23*x.*** Do this by using register ***$7*** for *x* and register **$10** for the final result. Load ***$7*** at the start of the program with an **ori** instruction. Assume that bit patterns represent positive integers using unsigned binary. Do the multiplication by shifting and adding. Notice that 23*x is equal to 16*x + 4*x + 2*x + x.

Don't use explicit multiply instructions. Do use the ***addu*** and maybe the ***addiu*** instructions.

Don't do input or output or loading and storing from memory. The instructions up through chapter 13 are enough. Put the result in register ***$10*** at the end of the program. Write the program so that the value for *x* can easily be changed by editing the ***ori*** instruction at the beginning of the program.

Execute your program by repeated "single steps". At the end, **$10** should hold the value you expect.

Create your source file using Notepad++ or other text editor. Align columns, do not use tab characters. Set the option of your editor to use space characters when the tab key is pressed. Every assembly language statement should be documented in a way that explains what it is doing in terms of the problem. Start your source file with

```
## CS 254 Program 2
##
## Compute 23*x
##
## Programmer:
## Date:
```

Following this, include a register use table. Set SPIM options to the following.

ON	Bare machine	**OFF**	Accept Pseudo Instructions
ON	Enable Delayed Branches	**ON**	Enable Delayed Loads
OFF	Enable Mapped I/O		
OFF	Load Exception Handler		

Set these options as specified or SPIM will start up with options you don't want. You *may*

have to set the options, close SPIM, and then restart it for the options to have an effect. Use only those instructions that have been discussed in the notes through chapter 13.

Include a register use table in the documentation at the top of your source program. The source program should be nicely formatted. Labels (symbolic addresses) should start in column one. Nearly every line of the program will have a meaningful comment. All comments should start in the same column, perhaps column 35. Upload your source file to Blackboard.