HW3 - Problem 4 solution

Iteration 1																				
Instr	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Iteration 1																				
In 1	F	D	**E**	M	W															
In 2		F	D	D	D	D	**E**	M	W											
In 3			F	F	F	F	D	**E**	M	W										
In 4							F	D	D	D	D	**E**	M	W						
In 5								F	F	F	F	D	**E**	M	W					
In 6												F	D	**E**	M	W				
In 7													F	D	D	**E**	M	W		
In 8														F	F	D	**E**	M	W	
Iteration 2																				
In 1	M	W																F	D	**E**
In 2	D	D	D	**E**	M	W													F	D
In 3	F	F	F	D	**E**	M	W													F
In 4				F	D	D	D	D	**E**	M	W									
In 5					F	F	F	F	D	**E**	M	W								
In 6									F	D	**E**	M	W							
In 7										F	D	D	**E**	M	W					
In 8											F	F	D	**E**	M	W				
Iteration 3																				
In 1															F	D	**E**	M	W	
In 2	**E**	M	W													F	D	D	D	D
In 3	D	**E**	M	W													F	F	F	F
In 4	F	D	D	D	D	**E**	M	W												
In 5		F	F	F	F	D	**E**	M	W											
In 6						F	D	**E**	M	W										
In 7							F	D	D	**E**	M	W								
In 8								F	F	D	**E**	M	W							

[1] CPI = 1.0 + $\frac{Number\ of\ bubbles}{Number\ of\ instructions\ or\ Number\ of\ Executes}$ = 1.0 + $\frac{25}{24}$ ≈ 2.042

[2] If a clock operates at 1GHz, Then each cycle takes 10^{-9} seconds.

Now, given the CPI of 2.042, we expect an execute every 2.042 cycles or (2.042 * 10^{-9}) seconds

Therefore the instruction per second achieved = $\frac{1\ instruction}{(2.042 * 10^{-9})\ seconds}$ = 0.49 GIPS = 490 MIPS.

GIPS: Giga instructions per second.

MIPS: Mega instructions per second.