



11 CSCI 3301 Section 03 COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE

bard / My courses / CSCI 3301_03 SEM1 / Week 12 / Quiz 2

Started on Monday, 27 December 2021, 3:36 PM

State Finished

Completed on Monday, 27 December 2021, 4:30 PM

Time taken 53 mins 52 secs

Marks 10.18/40.00

Grade 2.54 out of 10.00 (25%)

Information

Flag question

<https://italemc.iium.edu.my/pluginfile.php/75700/question/questiontext/106309/1/243646/loop.asm>

- Copy and paste this file into MARS. Then execute the program to answer the following questions.
- This asm file is referred to as Program A.
- Make sure the program is available until all 8 questions (from all 3 parts) are answered. You need to refer to this program for all 8 questions.

Information

Flag question

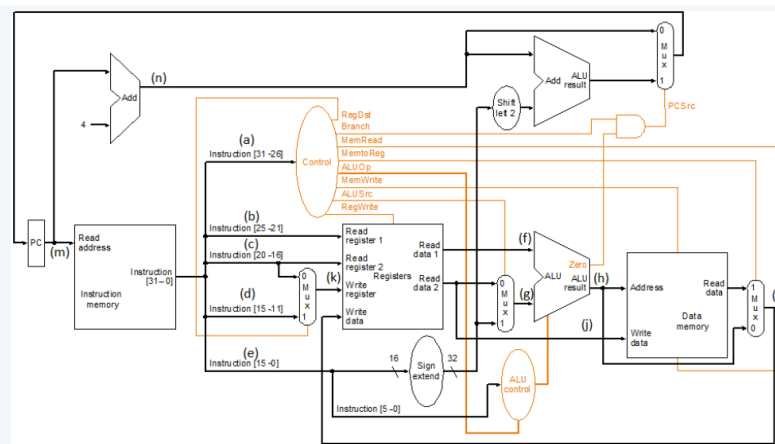
Text Segment				
Blkt	Address	Code	Basic	Source
0	0x00400000	0x24000000	addiu \$t0,\$0,0x00000011	3: li \$t0,\$011 #initialize 1st register with \$011
1	0x00400004	0x24000000	addiu \$t1,\$0,0x00000015	4: li \$t1,\$015 #initialize 2nd and 4th register with \$015
2	0x00400008	0x24000000	addiu \$t3,\$0,0x00000000	5: li \$t3,\$0 #initialize 3rd with 0
3	0x0040000c	0x24000000	addiu \$t2,\$0,0x00000000	6: li \$t2,\$0
4	0x00400010	0x24000000	addiu \$t4,\$0,0x00000000	7: li \$t4,\$0
5	0x00400014	0x24000000	addiu \$t5,\$0,0x00000000	8: li \$t5,\$0
6	0x00400018	0x24000000	addiu \$t6,\$0,0x00000000	9: li \$t6,\$0
7	0x0040001c	0x24000000	addiu \$t7,\$0,0x00000000	10: li \$t7,\$0
8	0x00400020	0x24000000	addiu \$t8,\$0,0x00000000	11: li \$t8,\$0
9	0x00400024	0x24000000	addiu \$t9,\$0,0x00000000	12: li \$t9,\$0
10	0x00400028	0x24000000	addiu \$t10,\$0,0x00000000	13: li \$t10,\$0
11	0x0040002c	0x24000000	addiu \$t11,\$0,0x00000000	14: li \$t11,\$0
12	0x00400030	0x24000000	addiu \$t12,\$0,0x00000000	15: li \$t12,\$0
13	0x00400034	0x24000000	addiu \$t13,\$0,0x00000000	16: li \$t13,\$0
14	0x00400038	0x24000000	addiu \$t14,\$0,0x00000000	17: li \$t14,\$0
15	0x0040003c	0x24000000	addiu \$t15,\$0,0x00000000	18: li \$t15,\$0
16	0x00400040	0x24000000	addiu \$t16,\$0,0x00000000	19: li \$t16,\$0
17	0x00400044	0x24000000	addiu \$t17,\$0,0x00000000	20: li \$t17,\$0
18	0x00400048	0x24000000	addiu \$t18,\$0,0x00000000	21: li \$t18,\$0
19	0x0040004c	0x24000000	addiu \$t19,\$0,0x00000000	22: li \$t19,\$0
20	0x00400050	0x24000000	addiu \$t20,\$0,0x00000000	23: li \$t20,\$0
21	0x00400054	0x24000000	addiu \$t21,\$0,0x00000000	24: li \$t21,\$0
22	0x00400058	0x24000000	addiu \$t22,\$0,0x00000000	25: li \$t22,\$0
23	0x0040005c	0x24000000	addiu \$t23,\$0,0x00000000	26: li \$t23,\$0
24	0x00400060	0x24000000	addiu \$t24,\$0,0x00000000	27: li \$t24,\$0
25	0x00400064	0x24000000	addiu \$t25,\$0,0x00000000	28: li \$t25,\$0
26	0x00400068	0x24000000	addiu \$t26,\$0,0x00000000	29: li \$t26,\$0
27	0x0040006c	0x24000000	addiu \$t27,\$0,0x00000000	30: li \$t27,\$0
28	0x00400070	0x24000000	addiu \$t28,\$0,0x00000000	31: li \$t28,\$0
29	0x00400074	0x24000000	addiu \$t29,\$0,0x00000000	32: li \$t29,\$0
30	0x00400078	0x24000000	addiu \$t30,\$0,0x00000000	33: li \$t30,\$0
31	0x0040007c	0x24000000	addiu \$t31,\$0,0x00000000	34: li \$t31,\$0
32	0x00400080	0x24000000	addiu \$t32,\$0,0x00000000	35: li \$t32,\$0
33	0x00400084	0x24000000	addiu \$t33,\$0,0x00000000	36: li \$t33,\$0
34	0x00400088	0x24000000	addiu \$t34,\$0,0x00000000	37: li \$t34,\$0
35	0x0040008c	0x24000000	addiu \$t35,\$0,0x00000000	38: li \$t35,\$0
36	0x00400090	0x24000000	addiu \$t36,\$0,0x00000000	39: li \$t36,\$0
37	0x00400094	0x24000000	addiu \$t37,\$0,0x00000000	40: li \$t37,\$0
38	0x00400098	0x24000000	addiu \$t38,\$0,0x00000000	41: li \$t38,\$0
39	0x0040009c	0x24000000	addiu \$t39,\$0,0x00000000	42: li \$t39,\$0
40	0x004000a0	0x24000000	addiu \$t40,\$0,0x00000000	43: li \$t40,\$0
41	0x004000a4	0x24000000	addiu \$t41,\$0,0x00000000	44: li \$t41,\$0
42	0x004000a8	0x24000000	addiu \$t42,\$0,0x00000000	45: li \$t42,\$0
43	0x004000ac	0x24000000	addiu \$t43,\$0,0x00000000	46: li \$t43,\$0
44	0x004000b0	0x24000000	addiu \$t44,\$0,0x00000000	47: li \$t44,\$0
45	0x004000b4	0x24000000	addiu \$t45,\$0,0x00000000	48: li \$t45,\$0
46	0x004000b8	0x24000000	addiu \$t46,\$0,0x00000000	49: li \$t46,\$0
47	0x004000bc	0x24000000	addiu \$t47,\$0,0x00000000	50: li \$t47,\$0
48	0x004000c0	0x24000000	addiu \$t48,\$0,0x00000000	51: li \$t48,\$0
49	0x004000c4	0x24000000	addiu \$t49,\$0,0x00000000	52: li \$t49,\$0
50	0x004000c8	0x24000000	addiu \$t50,\$0,0x00000000	53: li \$t50,\$0
51	0x004000cc	0x24000000	addiu \$t51,\$0,0x00000000	54: li \$t51,\$0
52	0x004000d0	0x24000000	addiu \$t52,\$0,0x00000000	55: li \$t52,\$0
53	0x004000d4	0x24000000	addiu \$t53,\$0,0x00000000	56: li \$t53,\$0
54	0x004000d8	0x24000000	addiu \$t54,\$0,0x00000000	57: li \$t54,\$0
55	0x004000dc	0x24000000	addiu \$t55,\$0,0x00000000	58: li \$t55,\$0
56	0x004000e0	0x24000000	addiu \$t56,\$0,0x00000000	59: li \$t56,\$0
57	0x004000e4	0x24000000	addiu \$t57,\$0,0x00000000	60: li \$t57,\$0
58	0x004000e8	0x24000000	addiu \$t58,\$0,0x00000000	61: li \$t58,\$0
59	0x004000ec	0x24000000	addiu \$t59,\$0,0x00000000	62: li \$t59,\$0
60	0x004000f0	0x24000000	addiu \$t60,\$0,0x00000000	63: li \$t60,\$0
61	0x004000f4	0x24000000	addiu \$t61,\$0,0x00000000	64: li \$t61,\$0
62	0x004000f8	0x24000000	addiu \$t62,\$0,0x00000000	65: li \$t62,\$0
63	0x004000fc	0x24000000	addiu \$t63,\$0,0x00000000	66: li \$t63,\$0
64	0x00400100	0x24000000	addiu \$t64,\$0,0x00000000	67: li \$t64,\$0
65	0x00400104	0x24000000	addiu \$t65,\$0,0x00000000	68: li \$t65,\$0
66	0x00400108	0x24000000	addiu \$t66,\$0,0x00000000	69: li \$t66,\$0
67	0x0040010c	0x24000000	addiu \$t67,\$0,0x00000000	70: li \$t67,\$0
68	0x00400110	0x24000000	addiu \$t68,\$0,0x00000000	71: li \$t68,\$0
69	0x00400114	0x24000000	addiu \$t69,\$0,0x00000000	72: li \$t69,\$0
70	0x00400118	0x24000000	addiu \$t70,\$0,0x00000000	73: li \$t70,\$0
71	0x0040011c	0x24000000	addiu \$t71,\$0,0x00000000	74: li \$t71,\$0
72	0x00400120	0x24000000	addiu \$t72,\$0,0x00000000	75: li \$t72,\$0
73	0x00400124	0x24000000	addiu \$t73,\$0,0x00000000	76: li \$t73,\$0
74	0x00400128	0x24000000	addiu \$t74,\$0,0x00000000	77: li \$t74,\$0
75	0x0040012c	0x24000000	addiu \$t75,\$0,0x00000000	78: li \$t75,\$0
76	0x00400130	0x24000000	addiu \$t76,\$0,0x00000000	79: li \$t76,\$0
77	0x00400134	0x24000000	addiu \$t77,\$0,0x00000000	80: li \$t77,\$0
78	0x00400138	0x24000000	addiu \$t78,\$0,0x00000000	81: li \$t78,\$0
79	0x0040013c	0x24000000	addiu \$t79,\$0,0x00000000	82: li \$t79,\$0
80	0x00400140	0x24000000	addiu \$t80,\$0,0x00000000	83: li \$t80,\$0
81	0x00400144	0x24000000	addiu \$t81,\$0,0x00000000	84: li \$t81,\$0
82	0x00400148	0x24000000	addiu \$t82,\$0,0x00000000	85: li \$t82,\$0
83	0x0040014c	0x24000000	addiu \$t83,\$0,0x00000000	86: li \$t83,\$0
84	0x00400150	0x24000000	addiu \$t84,\$0,0x00000000	87: li \$t84,\$0
85	0x00400154	0x24000000	addiu \$t85,\$0,0x00000000	88: li \$t85,\$0
86	0x00400158	0x24000000	addiu \$t86,\$0,0x00000000	89: li \$t86,\$0
87	0x0040015c	0x24000000	addiu \$t87,\$0,0x00000000	90: li \$t87,\$0
88	0x00400160	0x24000000	addiu \$t88,\$0,0x00000000	91: li \$t88,\$0
89	0x00400164	0x24000000	addiu \$t89,\$0,0x00000000	92: li \$t89,\$0
90	0x00400168	0x24000000	addiu \$t90,\$0,0x00000000	93: li \$t90,\$0
91	0x0040016c	0x24000000	addiu \$t91,\$0,0x00000000	94: li \$t91,\$0
92	0x00400170	0x24000000	addiu \$t92,\$0,0x00000000	95: li \$t92,\$0
93	0x00400174	0x24000000	addiu \$t93,\$0,0x00000000	96: li \$t93,\$0
94	0x00400178	0x24000000	addiu \$t94,\$0,0x00000000	97: li \$t94,\$0
95	0x0040017c	0x24000000	addiu \$t95,\$0,0x00000000	98: li \$t95,\$0
96	0x00400180	0x24000000	addiu \$t96,\$0,0x00000000	99: li \$t96,\$0
97	0x00400184	0x24000000	addiu \$t97,\$0,0x00000000	100: li \$t97,\$0
98	0x00400188	0x24000000	addiu \$t98,\$0,0x00000000	101: li \$t98,\$0
99	0x0040018c	0x24000000	addiu \$t99,\$0,0x00000000	102: li \$t99,\$0
100	0x00400190	0x24000000	addiu \$t100,\$0,0x00000000	103: li \$t100,\$0
101	0x00400194	0x24000000	addiu \$t101,\$0,0x00000000	104: li \$t101,\$0
102	0x00400198	0x24000000	addiu \$t102,\$0,0x00000000	105: li \$t102,\$0
103	0x0040019c	0x24000000	addiu \$t103,\$0,0x00000000	106: li \$t103,\$0
104	0x004001a0	0x24000000	addiu \$t104,\$0,0x00000000	107: li \$t104,\$0
105	0x004001a4	0x24000000	addiu \$t105,\$0,0x00000000	108: li \$t105,\$0
106	0x004001a8	0x24000000	addiu \$t106,\$0,0x00000000	109: li \$t106,\$0
107	0x004001ac	0x24000000	addiu \$t107,\$0,0x00000000	110: li \$t107,\$0
108	0x004001b0	0x24000000	addiu \$t108,\$0,0x00000000	111: li \$t108,\$0
109	0x004001b4	0x24000000	addiu \$t109,\$0,0x00000000	112: li \$t109,\$0
110	0x004001b8	0x24000000	addiu \$t110,\$0,0x00000000	113: li \$t110,\$0
111	0x004001bc	0x24000000	addiu \$t111,\$0,0x00000000	114: li \$t111,\$0
112	0x004001c0	0x24000000	addiu \$t112,\$0,0x00000000	115: li \$t112,\$0
113	0x004001c4	0x24000000	addiu \$t113,\$0,0x00000000	116: li \$t113,\$0
114	0x004001c8	0x24000000	addiu \$t114,\$0,0x00000000	117: li \$t114,\$0
115	0x004001cc	0x24000000	addiu \$t115,\$0,0x00000000	118: li \$t115,\$0
116	0x004001d0	0x24000000	addiu \$t116,\$0,0x00000000	119: li \$t116,\$0
117	0x004001d4	0x24000000	addiu \$t117,\$0,0x00000000	120: li \$t117,\$0
118	0x004001d8	0x24000000	addiu \$t118,\$0,0x00000000	121: li \$t118,\$0
119	0x004001dc	0x24000000	addiu \$t119,\$0,0x00000000	122: li \$t119,\$0
120	0x004001e0	0x24000000	addiu \$t120,\$0,0x00000000	123: li \$t120,\$0
121	0x004001e4	0x24000000	addiu \$t121,\$0,0x00000000	124: li \$t121,\$0
122	0x004001e8	0x24000000	addiu \$t122,\$0,0x00000000	125: li \$t122,\$0
123	0x004001ec	0x24000000	addiu \$t123,\$0,0x00000000	126: li \$t123,\$0
124	0x004001f0	0x24000000	addiu \$t124,\$0,0x00000000	127: li \$t124,\$0
125	0x004001f4	0x24000000	addiu \$t125,\$0,0x00000000	128: li \$t125,\$0
126	0x004001f8	0x24000000	addiu \$t126,\$0,0x00000000	129: li \$t126,\$0
127	0x004001fc	0x24000000	addiu \$t127,\$0,0x00000000	130: li \$t127,\$0
128	0x00400200	0x24000000	addiu \$t128,\$0,0x00000000	131: li \$t128,\$0
129	0x00400204	0x24000000	addiu \$t129,\$0,0x00000000	132: li \$t129,\$0
130	0x00400208	0x24000000	addiu \$t130,\$0,0x00000000	133: li \$t130,\$0
131	0x0040020c	0x24000000	addiu \$t131,\$0,0x00000000	134: li \$t131,\$0
132	0x00400210	0x24000000	addiu \$t132,\$0,0x00000000	135: li \$t132,\$0
133	0x00400214	0x24000000	addiu \$t133,\$0,0x00000000	136: li \$t133,\$0
134	0x00400218	0x24000000	addiu \$t134,\$0,0x00000000	137: li \$t134,\$0
135	0x0040021c	0x24000000	addiu \$t135,\$0,0x00000000	138: li \$t135,\$0
136	0x00400220	0x24000000	addiu \$t136,\$0,0x00000000	139: li \$t136,\$0
137	0x00400224	0x24000000	addiu \$t137,\$0,0x00000000	140: li \$t137,\$0
138	0x00400228	0x24000000	addiu \$t138,\$0,0x00000000	141: li \$t138,\$0
139	0x0040022c	0x24000000	addiu \$t139,\$0,0x00000000	142: li \$t139,\$0
140	0x00400230	0x24000000	addiu \$t140,\$0,0x00000000	143: li \$t140,\$0
141	0x00400234	0x24000000	addiu \$t141,\$0,0x00000000	144: li \$t141,\$0
142	0x00400238	0x24000000	addiu \$t142,\$0,0x00000000	145: li \$t142,\$0
143	0x0040023c	0x24000000	addiu \$t143,\$0,0x00000000	146: li \$t143,\$0
144	0x00400240	0x24000000	addiu \$t144,\$0,0x00000000	147: li \$t144,\$0
145	0x00400244	0x24000000	addiu \$t145,\$0,0x00000000	148: li \$t145,\$0
146	0x00400248	0x24000000	addiu \$t146,\$0,0x00000000	149: li \$t146,\$0
147	0x0040024c	0x24000000	addiu \$t147,\$0,0x00000000	150: li \$t147,\$0
148	0x00400250	0x24000000	addiu \$t148,\$0,0x00000000	151: li \$t148,\$0
149	0x00400254	0x24000000	addiu \$t149,\$0,0x00000000	152: li \$t149,\$0
150	0x00400258	0x24000000	addiu \$t150,\$0,0x00000000	153: li \$t150,\$0
151	0x0040025c	0x24000000	addiu \$t151,\$0,0x000	

Question 2

Partially correct

Mark 4.00 out of 7.00

Flag question



Program A runs on a single cycle processor with a clock rate of 4 GHz. What are the values for the following control signals in cycle 3?

RegWr	1	✓
MemtoReg	1	✗
RegDst	0	✓
ALUSrc	x	✗
MemRead	1	✗
Branch	0	✓
MemWr	0	✓

Your answer is partially correct.

You have correctly selected 4.

The correct answer is: RegWr \rightarrow 1, MemtoReg \rightarrow 0, RegDst \rightarrow 0, ALUSrc \rightarrow 1, MemRead \rightarrow 0, Branch \rightarrow 0, MemWr \rightarrow 0

Question 3

Incorrect

Mark 0.00 out of 2.00

Flag question

How long would it take for Program A to complete the execution, assuming it is running on a single cycle processor at 4 GHz clock rate? Write the answer using a standard prefix, e.g. 45 ps

Answer: $42/4 \times 10^9 = 105 \text{ ns}$

The correct answer is: 2.5 ns

Information

Flag question

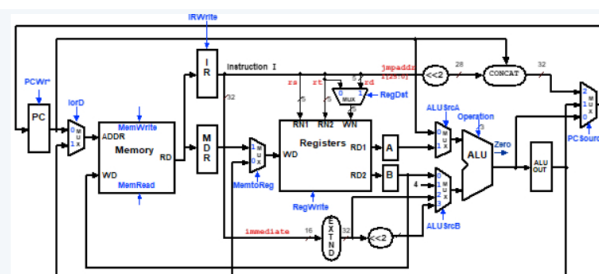
<u>Step</u>	Step name	Action for R-type instructions	Action for memory-reference instructions	Action for branches	Action for jumps
1: IF	Instruction fetch		IR = Memory[PC] PC = PC + 4		
2: ID	Instruction decode/register fetch		A = Reg [IR[25-31]] B = Reg [IR[20-26]]		
			ALUOut = PC + (sign-extend (IR[15-0]) << 2)		
3: EX	Execution, address computation, branch/ jump completion	ALUOut = A op B	ALUOut = A + sign-extend (IR[15-0])	if (A == B) then PC = ALUOut	PC = PC [31-28] (IR[25-0] << 2)
4: MEM	Memory access or R-type completion	Reg [IR[15-31]] = ALUOut	Load: MDR = Memory[ALUOut] or Store: Memory [ALUOut] = B		
5: WB	Memory read completion		Load: Reg[IR[20-31]] = MDR		

Question 4

Partially correct

Mark 3.33 out of 5.00

Flag question



Program A runs on a multicycle processor with a clock rate of 4 GHz. What are the values for the following label in cycle 37

PCWr ✓

lorD ✗

MemWrite ✓

MemRead ✗

IRWrite ✓

MemtoReg ✓

RegWr ✓

RegDst ✓

ALUSrcA ✗

ALUSrcB ✗

Operation ✓

PCSource ✓

Your answer is partially correct.

You have correctly selected 8.

The correct answer is: PCWr → 0,

lorD → x,

MemWrite → 0,

MemRead → 0,

IRWrite → 0,

MemtoReg → x,

RegWr → 0,

RegDst → x,

ALUSrcA → 1,

ALUSrcB → 0,

Operation → add,

PCSource → x

Question 5

Incorrect

Mark 0.00 out of 2.00

Flag question

How long would it take for Program A to complete the execution, assuming it is running on a multicycle processor at 4 GHz clock rate? Write the answer using a standard prefix, e.g. 45 ps

Answer: ✗

The correct answer is: 9.5 ns

Information

Flag question

Instruction	EX				MEM			WB	
	Reg Dst	ALU Op1	ALU Op0	ALU Src	Branch	Mem Read	Mem Write	Reg write	Mem to Reg
R-format	1	1	0	0	0	0	0	1	0
lw	0	0	0	1	0	1	0	1	1
sw	X	0	0	1	0	0	1	0	X
beq	X	0	1	0	1	0	0	0	X
I-format	0	1	0	1	0	0	0	1	0

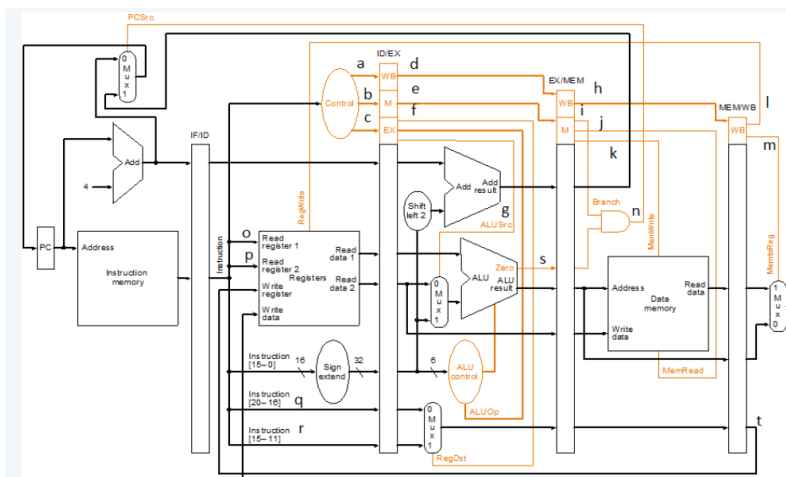
Referring to this table, answer the following questions.

Question 6

Partially correct

Mark 1.85 out of 6.00

Flag question



Program A runs on a pipelined processor with a clock rate of 4 GHz. What are the values for the following label in cycle 3?

- a 0101 ✖
- b 1100 ✖
- c 10 ✖
- d 1 ✖
- e 0 ✖
- f 0 ✔
- g 000 ✖
- h x ✔
- i x ✔
- j 0 ✖
- k 0 ✖
- l 1 ✖
- m x ✔

Your answer is partially correct.

You have correctly selected 4.

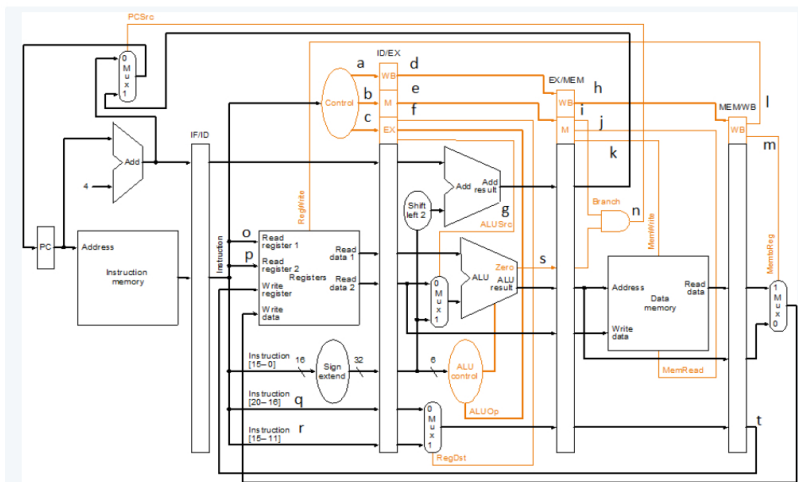
The correct answer is: a → 10, b → 000, c → 0101, d → 10, e → 000, f → 0, g → 1, h → x, i → x, j → x, k → x, l → x, m → x

Question 7

Incorrect

Mark 0.00 out of 5.00

Flag question



Program A runs on a pipelined processor with a clock rate of 4 GHz. What are the values for the following label in cycle 3?

- o 0x15 ✖
- p \$12 ✖
- q x ✖
- r \$0 ✖
- t 0x11 ✖

Your answer is incorrect.

The correct answer is: o → \$0, p → x, q → \$10, r → x, t → x

Question 8

Not answered

Marked out of 3.00

Flag question

How long would it take for Program A to complete the execution, assuming it is running on a pipelined processor at 4 GHz clock rate? Write the answer using a standard prefix, e.g. 45 ps

Answer: ✖

The correct answer is: 3.5 ns

[Finish review](#)

