Homework 7

1a   add , Mux x 4 , ALU , Regs x 2 J-mem ,

70 + (20 x 4) + 90 + 180 + 200 =

70 + 80 + 90 + 180 + 200 =

150 + 240 + 200 = 620 ps

b   I-mem , add , ALU , D-mem , sign-extend , mux x 4 , reg x 2

200 + 70 + 90 + 250 + 15 + (20 x 4) + 90 x 2 =

270 + 90 + 265 + 80 + 180 =

885 ps =

c   Add, Imem, reg , ALU, sign-extend , D-mem , Mux x 2 =

70 + 200 + 90 + 90 + 15 + 250 + (20 x 2) =

270 + 180 + 265 + 40 =

755 ps =

d   Imem , Mux x 2 , ALU, Sign-xtend , Shift << 2 , Add x 2 , reg =

200 + (20 x 2) + 90 + 15 + 10 + (10 x 2) + 90 =

240 + 115 + 140 + 90 =

585 ps =

e   I-mem , Add , shift << 2 , mux =

200 + 70 + 10 + 20 =

200 + 100 =

300 ps =

2

$$\overbrace{\underbrace{1010110011}_{31-26}\underbrace{00011}_{25-21}\underbrace{000100}_{20-16}\underbrace{00000000}_{15-11}00000000010100}^{15-0}$$

a   0000 0000 0000 0000 0000 0000 0000 0001 0100

b   00010100

c   00011 → r3 → 5

    00010100 ──────→ 20

d   0 0010 → r2 → 3