1.)

[A] P0.B0 (S, 120, 00 20)
[B] P0.B0 (M, 120, 00 80)
P0.B0 (I, 120, 00 20)
[C] P3.B0 (M, 120, 00 80)
[D] M: 110←30
P1.B2 (S, 110, 00 30)
P0.B2 (S, 110, 00 30)
[E] P0.B1 (M, 105, 00 48)
P3.B1 (I, 105, 00 08)
[F] M: 110←30
P0.B2 (M, 130, 00 78)
[G] P3.B2 (M, 130, 00 78)

2.)

REQ	ACTIVITY	A CACHE/STATUS	B CACHE/STATUS	MEMORY X
				7
Core B reads x	Cache read miss		7 (E)	7
Core A reads x	Cache read miss	7 (S)	7 (S)	7
Core B writes 2 at x	Write hit, invalidation for x	7 (I)	2 (E)	2
Core A reads x	Cache read miss	2 (S)	2 (S)	2
Core B writes 5 at x	Write hit, invalidation for x	2 (I)	5 (E)	5

S→Writes to shared block
E→Block owner
I→Invalid

3.)

REQ	ACTIVITY	A CACHE/STATUS	B CACHE/STATUS	MEMORY X
				8
Core A reads x	Cache read miss	8 (E)		8
Core B reads x	Cache read miss	8 (S)	8 (S)	8
Core A writes 3 at x	Write hit, write update for x	3 (S)	3 (S)	8
Core A writes 4 at x	Write hit, write update for x	4 (S)	4 (S)	8
Core B reads x	Read hit	4 (S)	4 (S)	8

S→Write update to shared block
E→Block owner
I→Invalid

4.)

[A]

Ring has 64 processors; the message will need to traverse 32 hops (64/2)

Ring: $(100 + 10)(32) = 420\,ns$

Traverses both the row (8) and the column (8) of the grid, for a total of 16 hops

8x8 grid: $(100 + 10)(16) = 260\,ns$

Longest communication path on a 2n hypercube has n links, so in this case, the message will need to traverse 6 links (log2(64) = 6)

Hypercube: $(100 + 10)(6) = 160\,ns$

[B]

Base CPI = 0.75 and 2.0 GHz → 2 clock cycles; 1 ns

Ring: $\frac{0.2}{100(420)(2)} + 0.75 = 2.43\,CPI$

8x8 grid: $\frac{0.2}{100(260)(2)} + 0.75 = 1.79\,CPI$

Hypercube: $\frac{0.2}{100(160)(2)} + 0.75 = 1.39\,CPI$