Solutions

2.1

- The IR (instruction register) – PC supplies the address ✓.

2.2

- 4 (one word) ✓.

2.3

- Temporal (recently used again soon) and spatial (neighbours used soon) ✓.

3.1

- LOAD: R1 ← mem[100] = 7; PC 0 → 4 ✓.
- ADD: R3 ← 7 + 7 = 14; PC 4 → 8 ✓.
- STORE: mem[100] ← 14; PC 8 → 12 ✓.
- Only these change: the loop names its own deltas ✓.

3.2

- 64-byte line, 4-byte ints: 16 consecutive elements per line – row-major reuses each line 16×, column-major strides 16 KB and misses nearly every element ✓.
- Row-major exploits spatial locality; the reuse-of-line is spatial, not temporal ✓.
- Loop-interchange (reorder to keep the fast index inner) fixes the program; a bigger cache cannot hold the working set of a strided sweep – capacity misses persist ✓.