CS31 Written Homework 6: Direct Mapped Caching

In this assignment, you will answer questions about Direct Mapped Caches. For these qustions, assume a system with:

- 8-bit memory addresses
- 2-byte cache block size

- 4 cache lines.

Question 1

How many bytes of data can be stored in the cache? Do not include metadata like the tag or valid bit.

Question 2

How are the tag bits used in a direct mapped cache? How are the byte offset bits used in a direct mapped

cache?

Question 3

Divide the following address bits into the `tag` and `byte offset`.

    1 0 1 0 1 0 1 0   0 0 1 1 1 0 1 1

Question 4

On the diagram of the Direct Mapped Cache on the next page, show the results of the following memory operations (R: read, W: write). Within each box, time should progress downward, so the first address loaded appears at the top and subsequent changes are written below. To the right of the table, label each change with number of the operation that caused it. Annotate each operation below with *hit* or *miss* to indicate whether the data was found in the cache. Don't forget to update the dirty and valid bits!

1. R 0 0 0 1 1 0 1 0
2. W 0 0 0 1 1 0 1 1
3. R 1 1 1 1 1 0 0 0
4. R 1 1 1 1 1 0 1 0

5. R 0 1 1 0 1 0 0 0
6. W 0 0 0 0 1 0 0 1
7. R 0 0 0 0 0 0 0 0
8. W 0 0 0 1 1 0 1 0

Direct Mapped Cache

index	dirty	valid	tag
0		0	
1		0	
2		0	
3		0	