Finding Data in a Cache

Start with address (bits are interpreted as unsigned numbers)

*no index if cache is fully associative

Look at **INDEX**'s valid bit tag in the cache. Is the data valid?

No, cache is empty at this index

Yes!

Compulsory cache miss. Load data from memory. Set valid bit of block to 1.

Is the cache direct-mapped?

Yes!

Look at block at **INDEX**. Does the tag match **TAG**?

No, set associative or fully associative

No

Yes!

Search all tags in **INDEX**, or all tags if fully associative. Does any tag match **TAG**?

Yes!

Cache hit!
Find data at **OFFSET** and return this value.

Cache miss and replacement. Replace block with correct data from memory.

No

No, set is not full

No, write-through

Does the number of blocks in the set match the max number of blocks per set?

Yes. The set is full

Is the cache write-back?

Yes!

Select block for replacement. If dirty bit is on, write that block back to memory.