Assignment 3 Problem 5

Consider the list of keys:

[1 2 3 4 5 6 7 8 9 10]

and assume we perform the following searches:

8, 6, 3, 7, 5*, 5, 2, 6, 2, 8*, 3, 9, 3, 8*

a) Using the move-to-front heuristic, give the list ordering after the starred ($\star$) searches are performed. Additionally, record the number of comparisons between keys after each search, as well as, the total number of comparisons.

The ordering after the 5*:

[5 7 3 6 8 1 2 4 9 10]

The ordering after the first 8*:

[8 2 6 5 7 3 1 4 9 10]

The ordering after the second 8*:

[8 3 9 2 6 5 7 1 4 10]

8	6	3	7	5	5	2	6	2	8	3	9	3	8	Total
8	7	5	8	8	1	7	5	2	6	6	9	2	3	77

b) Repeat part (a), using the transpose heuristic instead of the move-to-front heuristic.

The ordering after the 5*:

[1 3 2 4 5 6 7 8 9 10]

The ordering after the first 8*:

[2 1 3 5 6 4 8 7 9 10]

The ordering after the second 8*:

[3 2 1 5 6 8 4 9 7 10]

8	6	3	7	5	5	2	6	2	8	3	9	3	8	Total
8	6	3	8	6	5	3	6	2	8	3	9	2	7	76

c) Another heuristic is *move-to-front2 (MTF2)* that is similar to *move-to-front (MTF)* except that when an element is found at position i it is moved to position $\lfloor \frac{i}{2} \rfloor$. Repeat part (a), using this heuristic.

The ordering after the $5^\star$:

$$[1\ 3\ 2\ 5\ 7\ 6\ 8\ 4\ 9\ 10]$$

The ordering after the first $8^\star$:

$$[2\ 1\ 6\ 8\ 5\ 3\ 7\ 4\ 9\ 10]$$

The ordering after the second $8^\star$:

$$[2\ 3\ 8\ 1\ 6\ 9\ 5\ 7\ 4\ 10]$$

8	6	3	7	5	5	2	6	2	8	3	9	3	8	Total
8	7	3	8	8	4	4	6	2	7	6	9	3	6	81