

8 Algorithms (FMS)

This question is about hash tables.

- (a) Briefly explain *hash functions*, *hash tables* and *collisions*. [3 marks]
- (b) Explain the *open addressing* strategy of collision resolution and the term *probing sequence* used in that context. [3 marks]
- (c) Explain *quadratic probing* and its advantages and disadvantages. [*Hint*: refer to primary and secondary clustering.] [3 marks]
- (d) Give a general mathematical expression for the probing function $p(k, i)$ used in quadratic probing. The expression should yield a 0-based index into the table, referencing the key k , the probe number i , the hash function h , the table size m and the constants c_1 and c_2 . [3 marks]
- (e) Does the following pseudocode implement a form of quadratic probing? If so, derive values for c_1 and c_2 in the equation you produced for part (d). If not, prove it doesn't. In either case, clearly justify your reasoning. [8 marks]

```
def get(k):
    j = h(k)
    i = 0
    while true:
        if T[j].key == null: raise NotFound
        if T[j].key == k: return T[j].payload
        i = i+1
        if i == m: raise NotFound
        j = (i+j) mod m
```