

## Hashing – Open Addressing – Expected number of probes

Using concepts from probability and calculus, formulas can be derived for the expected number of probes that occur when searching for a key in a hash table. Here are some useful formulas that you might find convenient to use in one of the Gradiance homeworks:

	Expected number of probes for unsuccessful searches (when the key is not present in the table)	Expected number of probes for successful searches (when the key is present in the table)
Linear probing (where clustering does occur)	$\frac{1}{2} \left( 1 + \frac{1}{(1 - \lambda)^2} \right)$	$\frac{1}{2} \left( 1 + \frac{1}{(1 - \lambda)} \right)$
Double hashing (where clustering does not occur)	$\frac{1}{(1 - \lambda)}$	$\frac{1}{\lambda} \ln \frac{1}{(1 - \lambda)}$

In these formulas,  $\lambda$  denotes the *load factor*, that is, the ratio  $n/m$  where  $n$  = number of keys and  $m$  = number of slots in the table.