Implementation of DBMS
Exercise Sheet 5
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1) Suppose that we have 4096-byte blocks in which we store records of 100 bytes. The block header consists of an offset table using 2-byte pointers to records within the block. Each day one record is deleted (if records are in the block) and afterwards two records are inserted. A deleted record must have its pointer in the offset table replaced by a tombstone. If the block is initially empty, for how many days can we insert records into a block?

2) Suppose that if we swizzle all pointers automatically, we can perform the swizzling in half the time it would take to swizzle each one separately. If the probability that a pointer in main memory will be followed at least once is p, for what values of p is it more efficient to swizzle automatically than on demand?

3) Suppose blocks hold either three records or ten key-pointer pairs. As a function of n, the number of records, at least how many blocks do we need to hold
a) the data file
b) a dense index
c) a sparse index
You can ignore inaccuracies that result from rounding.

4) Suppose blocks hold either ten records, or 50 key-pointer pairs. We have a data file with 10^6 records. In this task we assume that each block will be as full as possible.
a) How many blocks do we need for the data file?
b) How many blocks do we need for a dense index?
c) How many blocks do we need for a sparse index?
d) We want to add higher level index structures to the index considered in b). Describe how many blocks we have in these higher levels until we end up in a level with just one block.
e) Repeat d) for the sparse index in c).