Name:_____

CMSC 661 – Principles of Database Systems Spring 2011, Handout 3

Sections covered since Exam II: 10.1 to 10.9, 11.1 to 11.6, 12.1 to 12.5.3, 12.7, 13.1 to 13.3.3, 14.1 to 14.10.

1. Identify each part (A through F) of the slotted-page structure used to store variable-length records.

A	B	C	D	E	F

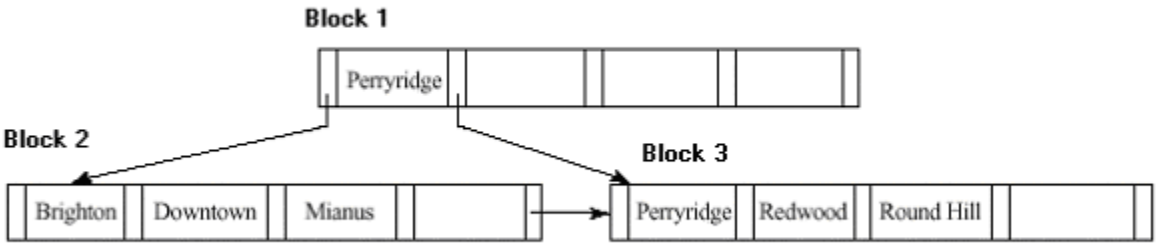
2. For the B+ tree below,
   a. What is n?

   b. How many values can be stored in non-leaf nodes?

   c. Would a new value fit into one of the existing leaf nodes?

   d. In which block would the value "Frederick" be stored?

   e. In which block would the value "Arbutus" be stored?



3. Consider the following schedule.

Time	T1	T2
1	read(A)	
2	write(A)	
3		read(A)
4	read(B)	
5	write(B)	
6		write(A)

Is the schedule conflict serializable as <T1, T2>? Explain why or why not.

4. Consider the following SQL query using R (A, B, C, D) and S (D, E), where r(R) and s(S). Consider the relational algebra expression, derived from the SQL. Using equivalence rules, suggest an equivalent relational algebra expression that is more efficient.

```
select  s.E, r.A
from    r, s
where   r.D = s.D
and     s.D = 'Baltimore'
and     r.B = 'Sales'
```

$\Pi_{s.E,\ r.A} (\sigma_{r.D = s.D \wedge s.D = \text{'Baltimore'} \wedge r.B = \text{'Sales'}} (r \times s))$

5. Given R (A, B, C, D) and S (D, E), where r(R) and s(S), assume that r has 1,000,000 rows with 100 rows stored per block, s has 100,000 rows with 500 rows stored per block, the block seek time is 0.4 microseconds, and the block transfer time is 0.1 microseconds, there is a primary index on A and a secondary index on B. Assume the height of any index used is 5. Assume there are 5 rows where B = 'Baltimore'. How long will it take to execute the following statements?

   $\sigma_{B = \text{'Baltimore'}} (r)$

   $r \bowtie s$