**Assignment#3**

**MSIT 630 Database Systems (Summer, 2019)**

**Total: 40 points**

**Due: 7/7/2019 11:59PM**

**1. What is an SQL injection attack? Explain how it works, and what precautions must be taken to**

**prevent SQL injection attacks. (4 points)**

**2. What are two advantages of encrypting data stored in the database? (4 points)**

**3. RAID systems typically allow you to replace failed disks without stopping access to the**

**system. Thus, the data in the failed disk must be rebuilt and written to the replacement disk while**

**the system is in operation. Which of the RAID levels yields the least amount of interference**

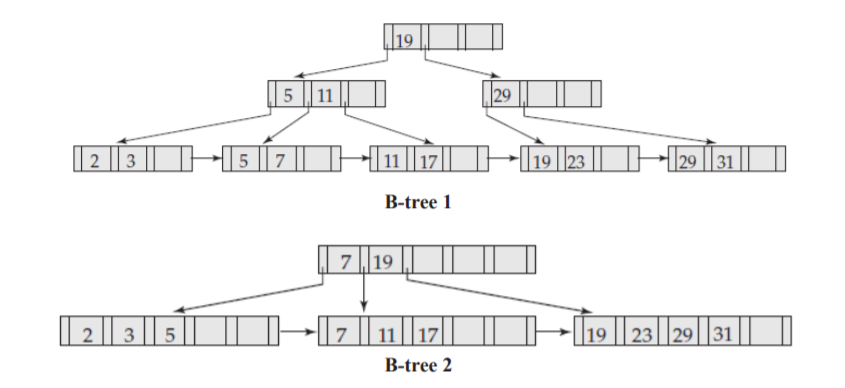
**between the rebuild and ongoing disk accesses? Explain your answer. (4 points)**

**4. In the sequential file organization, why is an overflow block used even if there is, at the**

**moment, only one overflow record? (4 points)**

**5. For each of the following two B+ trees, show the steps involved in the following queries: (10**

**points) (Note: there are two B+ trees. You are supposed to answer question #a and #b for both**

**trees). **

**a. Find records with a search-key value of 7.**

**b. Find records with a search-key value between 3 and 17, inclusive.**

**B-tree 1**

**B-tree 2**

**6. What are the causes of bucket overflow in a hash file organization? What can be done to**

**reduce the occurrence of bucket overflows? (4 points)**

**7. Why is a hash structure not the best choice for a search key on which range queries are likely?**

**(4 points)**

**8. Suppose you need to sort a relation of 50 gigabytes, with 4 kilobyte blocks, using a memory size of 40 megabytes. Suppose the cost of a seek is 4 milliseconds, while the disk transfer rate is 50 megabytes per second. (6 points) a. Find the cost of sorting the relation, in seconds, with bb = 100. b. How many merge passes are required?**