**CS 4347: Database Systems  
Homework 1**

**Due: 9/2 – 100 points  
Late: 9/7 – 50 points**

1. What four main types of actions involve databases? Briefly discuss each.
   1. **CRUD Operations**
      1. Create
      2. Read
      3. Update
      4. Delete
2. What are the responsibilities of the DBA and the database designers?
   1. **DBA**
      1. authorize users to access database
      2. chief admin responsible for managing resources
      3. control and monitor how efficient the implementation of CRUD operations are
   2. **Database Designers**
      1. Identify what data will be stored
      2. Determine which appropriate structures to use as storage
      3. Develop database views
3. What is the difference between controlled and uncontrolled redundancy? Illustrate with examples.
   1. **Controlled Redundancy**
      1. Increases efficiency of Read operations
      2. Precise and concurrent copies of certain rows, that update when any copy changes
   2. **Uncontrolled Redundancy**
      1. Breaks the systems predictability
      2. Multiple copies of rows, that might have different values stored in each copy
      3. Results in unpredictable read operations, because the search could return different values, depending on which copy is found first
4. Specify all the relationships among the records of the database shown in Figure 1.2.
   * 1. STUDENTS have unique a STUDENT\_NUMBER
     2. STUDENTs major in DEPARTMENTs
     3. STUDENTs take SECTIONs
     4. SECTIONS are taught by INSTRUCTORs
     5. SECTIONs are of specific COURSEs
     6. COURSEs have prerequisite COURSEs
     7. COURSEs are offered by DEPARTMENTs
5. Cite some examples of integrity constraints that you think can apply to the database shown in Figure 1.2.
   1. Integrity Constraint
   2. Examples
      1. Do not allow deletion of the class record, if there are students enrolled
      2. Do not allow deletion of course, if there are sections offered
      3. Do not allow a student to enroll, who has not fulfilled the prerequisites
      4. All
6. Consider Figure 1.2.
   1. If the name of the ‘CS’ (Computer Science) Department changes to ‘CSSE’ (Computer Science and Software Engineering) Department and the corresponding prefix for the course number also changes, identify the columns in the database that would need to be updated.
   2. Can you restructure the columns in the COURSE, SECTION, and PREREQUISITE tables so that only one column will need to be updated?

