Assignment 02

Solution

(question number from PDF)

Question 01

- Minimum = 0
  - No entity-set has total participation constraints
  - At minimum, no entity is required to participate in R
  - Hence, minimum is 0
- Maximum = 10
  - E3 has key constraint
    - E3 can participate in R at most 1 time
  - There are 10 entities in E3
    - Maximum is achieved when all E3 has participated
  - Hence, maximum is 10

Question 02

- Minimum = 60
- Maximum = 60
  - Covering constraint means that every element in E0 must be in either E1, E2, or E3
  - Additionally, not satisfying overlap constraint means that entities in E1 cannot be in E2, etc
  - Hence, minimum = maximum = 15+20+25 = 60

Question 03

- Minimum = 10
  - By covering constraint, minimum is 50-25-15 = 10
  - Since there are 10 entities in E0 not in either E1 or E2
- Maximum = 50
  - By overlap constraint, all entities in E0 can be in E3
  - Hence, maximum is 50

Question 04

- Answer: C,E
  - Reasoning for C
    - Consider table E2 to mean combined relation R and entity E2
    - PK (a_1, a_2) ensures that
      - Every a_2 is in R
        - total participation constraint
      - There can be (a_1^1, a_2) and (a_1^2, a_2)
        - no key constraint
      - Every unique a_2 can uniquely identify an entity E2
        - by virtue of not having any other attributes
  - Reasoning for E
    - By translation of weak entity-set to SQL from lecture note

Question 05

- Answer: E
  - Reasoning for NOT C
    - Consider table E2 to mean combined relation R and entity E2
    - PK (a_1, a_2) ensures that
      - Every a_2 is in R
        - total participation constraint
      - There can be (a_1^1, a_2) and (a_1^2, a_2)
        - no key constraint
      - a_2 cannot uniquely identify entity in E2
        - we can have (a_1^1, a_2, b_2^1) and (a_1^2, a_2, b_1^2) and thus violate PK of E2
  - Reasoning for E
    - By translation of weak entity-set to SQL from lecture note

Question 06

- Answer: B,C
  A. Consider (a, b) as PK, this cannot be enforced by column constraint
  B. But (a, b) can be enforced by table constraint
     - `PRIMARY KEY (a,b)`
  C. `CHECK (a IS NOT NULL)`
  D. Consider the pair (a, b) as unique, this cannot be enforced by column constraint
     - Consider `a integer UNIQUE, b integer UNIQUE`
       - This means both a and b is individually unique
     - Need to use `UNIQUE (a,b)`
  E. Since B,C is true, this statement is automatically false

Question 07

- Answer: A,B,C
  - C1. No covering constraint is specified
  - C2. No overlap constraint is specified
  - C3. Should use double-line arrow between adventurer and registered (i.e., Adventurer ==> Registered)
  - C4. Correct use of double-line without arrow
  - C5. Since Party is a relationship, each tuple in Party consists of a triple (Fighter, Mage, Healer)

Question 08

- Answer: C,D,E
  - C1. `type` can only be the three specified value
  - C2. `type` cannot be null
  - C3. `gid` is not part of Adventurer table
  - C4. `gid` is a PK, cannot have (gid_1, aid_1) and (gid_1, aid_2)
  - C5. Not checked if fighter have type='fighter', etc