

Name:- Stewart DulaneyId#:- 1545566**Part A:- Multiple Choice**

[10 Points]

Circle the letter of the **best choice**.

1. The property of _____ enables an entity subtype to inherit the attributes and relationships of the supertype.
 - a) subtype discriminator
 - ☒ b) inheritance
 - c) specialization hierarchy
 - d) entity supertype
2. At the implementation level, the supertype and its subtype(s) depicted in a specialization hierarchy maintain a(n) _____ relationship.
 - a) self-referencing
 - ☒ b) 1:1
 - c) 1:M
 - d) M:N
3. If Tiny College has some departments that are classified as "research only" and do not offer courses, the COURSE entity of the college database would be _____ the DEPARTMENT entity.
 - a) existence-dependent on
 - b) independent of
 - ☒ c) mandatory for
 - ☒ d) optional to
4. A table that has all key attributes defined, has no repeating groups, and all its attributes are dependent on the primary key is said to be in _____.
 - ☒ a) 1NF
 - b) 2NF
 - c) 3NF
 - d) 4NF
5. A(n) _____ exists when there are functional dependencies such that Y is functionally dependent on X, Z is functionally dependent on Y, and X is the primary key.
 - a) partial dependency
 - b) repeating group
 - c) atomic attribute
 - ☒ d) transitive dependency

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6. The last step in the Database Life Cycle (DBLC) is ____.
- ☒ a) maintenance and evolution
 - b) operation
 - c) testing and evaluation
 - d) implementation and loading
7. A centralized database management is subject to a problem such as ____.
- ☒ a) growing numbers of remote locations
 - b) maintaining and operating small database systems
 - c) dependence on multiple sites
 - d) organizational flexibility of the database
8. In the context of the database design process, the conceptual design step that defines the fragmentation and allocation strategy is ____ must be able to guarantee unique attribute values.
- a) database analysis and requirements
 - b) ER modeling and normalization
 - c) data model verification
 - ☒ d) distributed database design
9. The syntax for a left outer join is ____.
- a) SELECT column-list
FROM table1 OUTER JOIN table2 LEFT
WHERE join-condition
 - ☒ b) SELECT column-list
FROM table1 LEFT [OUTER] JOIN table2
ON join-condition
 - c) SELECT column-list
WHERE LEFT table1 = table
 - d) SELECT column-list
FROM table1 LEFT table2 [JOIN]
WHERE join-condition
10. How many rows would be returned from a cross join of tables A and B, if A contains 8 rows and B contains 18?
- a) 8
 - b) 18
 - c) 26
 - ☒ d) 144

Name:- Stewart DulaneyId#:- 1545566**Part B:-** Answer all 3 questions in spaces provided.**Question 1:-** Given the following business scenario, create a **Crow's Foot ERD using a specialization hierarchy**. [10 Points]

AON Sales Company keeps information on employees and the departments that they work in.

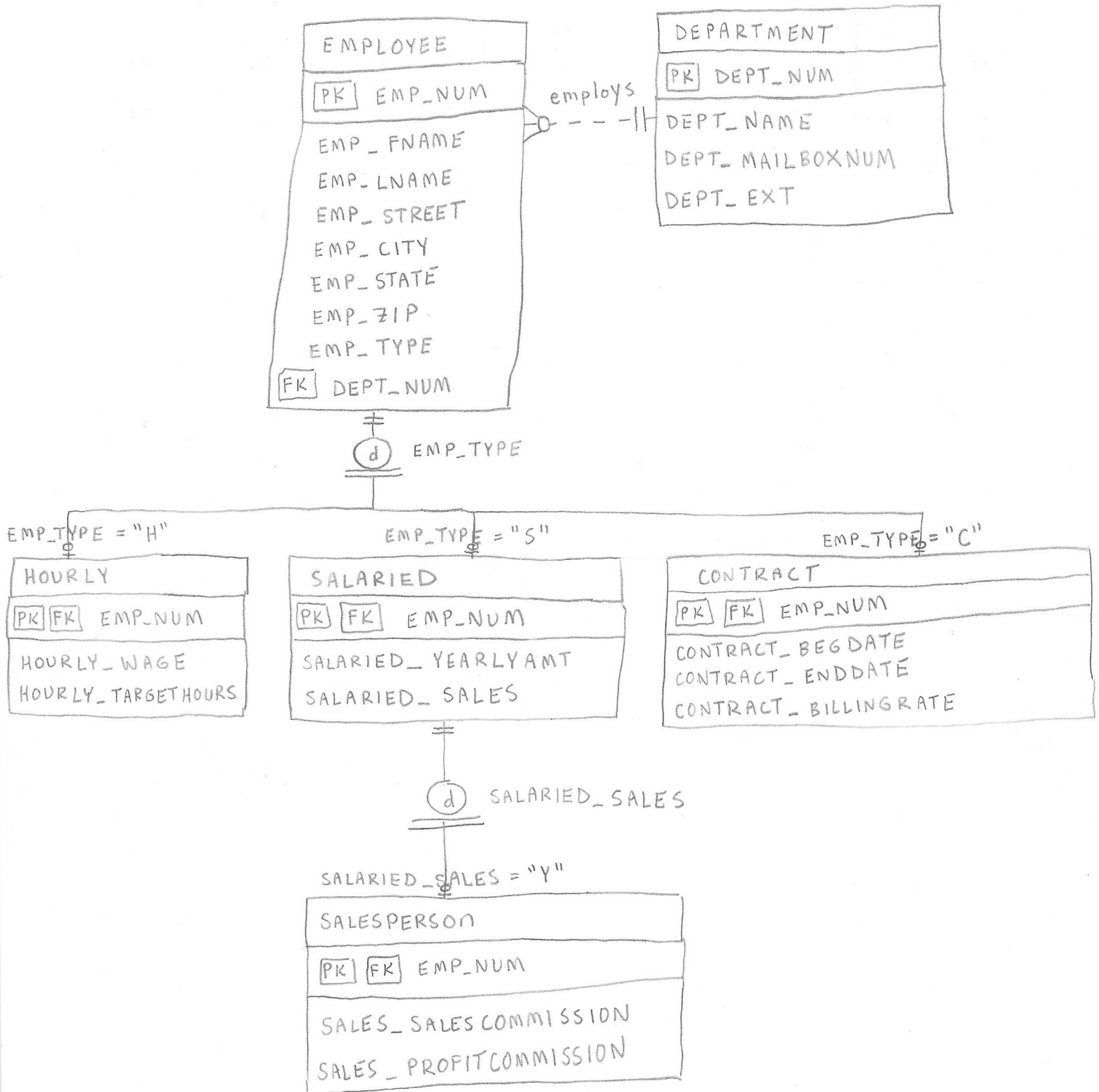
- For each department, the department name, internal mail box number, and office phone extension are kept.
- A department can have many assigned employees, and each employee is assigned to only one department.
- Employees can be salaried employees, hourly employees, or contract employees. All employees are assigned an employee number. This is kept along with the employee's name and address.
- For hourly employees, hourly wage and target weekly work hours are stored (e.g. the company may target 40 hours/week for some, 32 hours/week for others, and 20 hours/week for others).
- Some salaried employees are salespeople that can earn a commission in addition to their base salary. For all salaried employees, the yearly salary amount is recorded in the system.
- For salespeople, their commission percentage on sales and commission percentage on profit are stored in the system. For example, John is a salesperson with a base salary of \$50,000 per year plus 2-percent commission on the sales price for all sales he makes plus another 5 percent of the profit on each of those sales.
- For contract employees, the beginning date and end dates of their contract are stored along with the billing rate for their hours.

For full points, be sure to indicate:-

- ☒ • higher-level entity super types (parent entities) and lower-level entity subtypes (child entities)
- ☒ • any shared or inherited attributes and relationships
- ☒ • disjoint/overlapping constraints
- ☒ • partial/complete constraints
- ☒ • any subtype discriminators

Note the following:

- EMPLOYEE is the entity supertype of the entity subtypes HOURLY, SALARIED, and CONTRACT. This has a total completeness constraint and a disjoint constraint.
 - So EMP_TYPE cannot be null and each EMPLOYEE can only be a member of one subtype.
- SALARIED is the entity supertype of the entity subtype SALESPERSON. This has a total completeness constraint and a disjoint constraint.
 - So SALARIED-SALES cannot be null and each SALARIED can only be a member of one subtype (SALARIED-SALES = "Y" so is a salesperson or = "N" and is not a salesperson).

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Name:- Stewart DulaneyId#:- 1545566**Question 2:-** Using the STUDENT table structure shown, do the following:-

[25 Points]

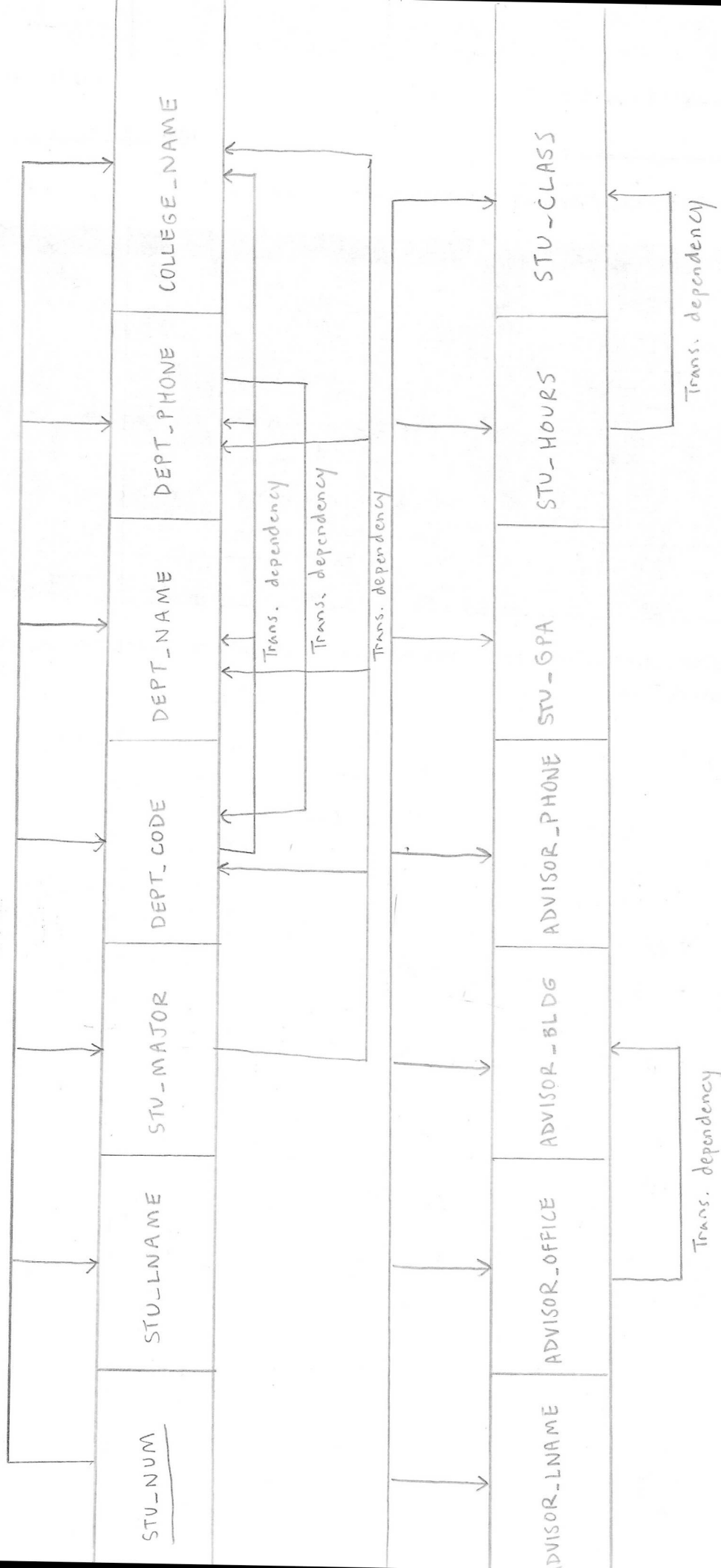
Attribute Name	Sample Value	Sample Value	Sample Value	Sample Value	Sample Value
STU_NUM	211343	200128	199876	199876	223456
STU_LNAME	Stephanos	Smith	Jones	Ortiz	McKulski
STU_MAJOR	Accounting	Accounting	Marketing	Marketing	Statistics
DEPT_CODE	ACCT	ACCT	MKTG	MKTG	MATH
DEPT_NAME	Accounting	Accounting	Marketing	Marketing	Mathematics
DEPT_PHONE	4356	4356	4378	4378	3420
COLLEGE_NAME	Business Admin	Business Admin	Business Admin	Business Admin	Arts & Sciences
ADVISOR_LNAME	Grastrand	Grastrand	Gentry	Tillery	Chen
ADVISOR_OFFICE	T201	T201	T228	T356	J331
ADVISOR_BLDG	Torre Building	Torre Building	Torre Building	Torre Building	Jones Building
ADVISOR_PHONE	2115	2115	2123	2159	3209
STU_GPA	3.87	2.78	2.31	3.45	3.58
STU_HOURS	75	45	117	113	87
STU_CLASS	Junior	Sophomore	Senior	Senior	Junior

- a. Write the relational schema and draw its dependency diagram. Identify all dependencies, including any transitive dependencies. [5 Points]

Note the following:

- The STUDENT table is automatically in 2NF b/c it is impossible to have partial dependencies when the PK (STU_NUM) consists of a single attribute.
- ADVISOR_OFFICE is a determinant of ADVISOR_BLDG b/c it has a prefix indicating which building the office is in.

STUDENT (STU_NUM, STU_LNAME, STU_MAJOR, DEPT_CODE, DEPT_NAME, DEPT_PHONE, COLLEGE_NAME, ADVISOR_LNAME, ADVISOR_OFFICE, ADVISOR_BLDG, ADVISOR_PHONE, STU_GPA, STU_HOURS, STU_CLASS)



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b. Write the relational schema and draw the dependency diagram to meet 3NF requirements.

Note the following:

- It is safe to ignore the transitive dependency (ADVISOR-OFFICE \rightarrow ADVISOR-BLDG) b/c it can be argued that having to partition the prefix to get a dependency means that it is not a determinant in a strict sense, and it does not cause any practical problems.
- We choose to also ignore the transitive dependency (STU-HOURS \rightarrow STU-CLASS) b/c any value of STU-HOURS within a range corresponds to a particular STU-CLASS so so it would not make sense to create a new table w/ STU-HOURS as the primary key.
- We choose to also ignore the transitive dependency (DEPT-PHONE \rightarrow DEPT-CODE) b/c it does not cause any practical problems.
- Therefore, these considerations justify retaining a 2NF structure.

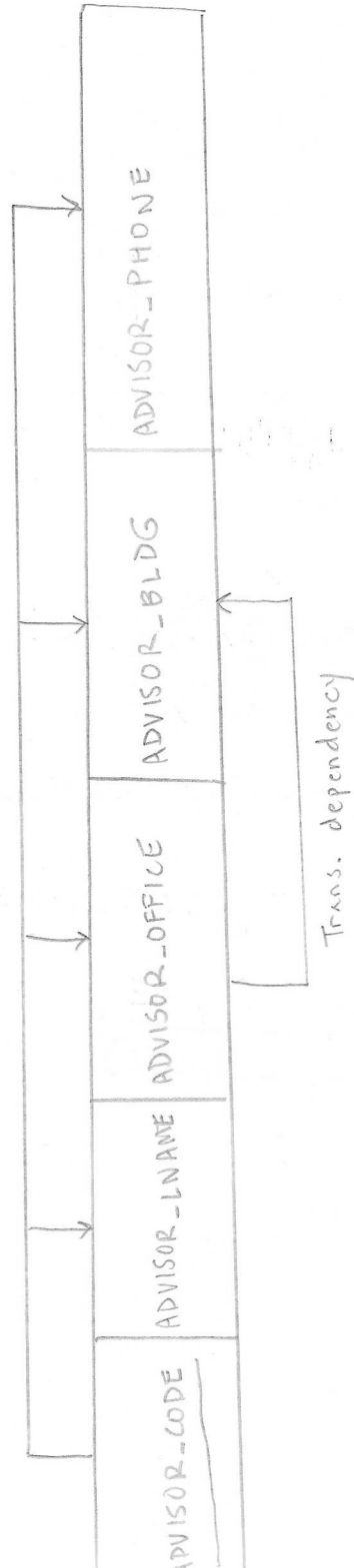
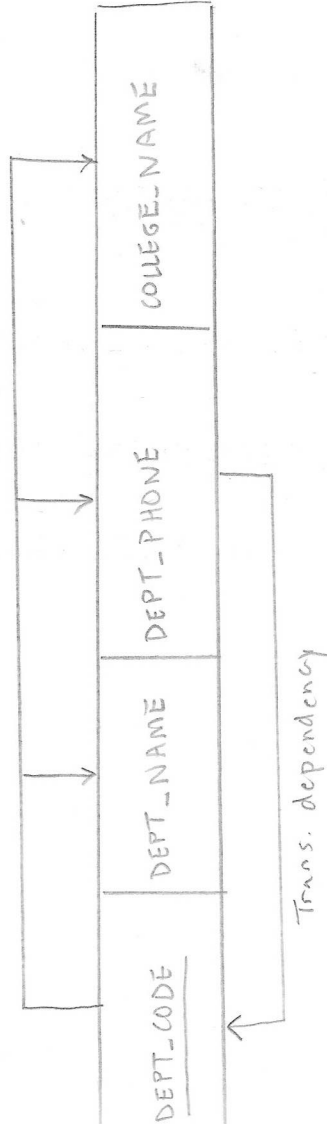
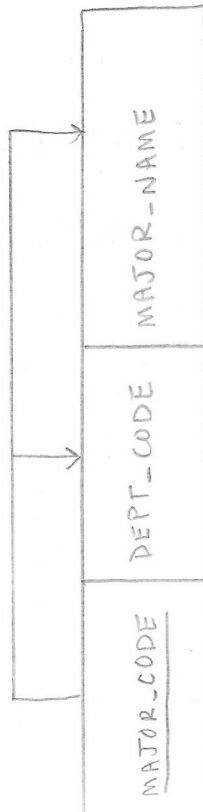
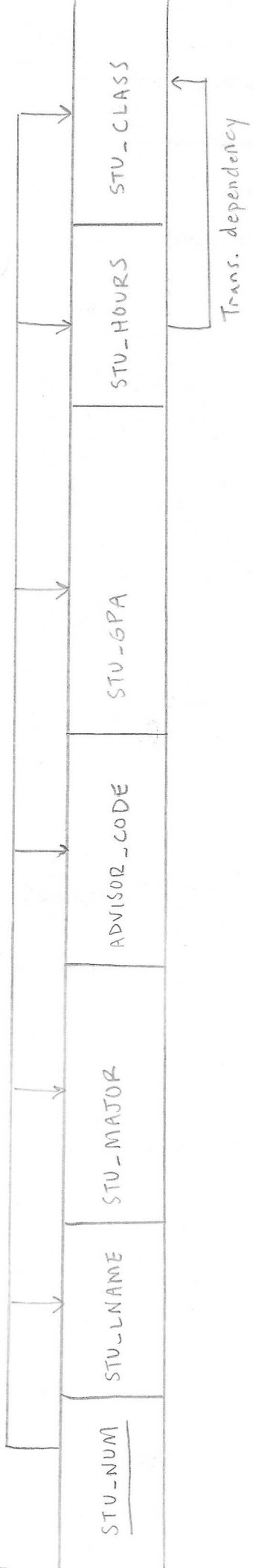
[10 Points]

STUDENT (STU_NUM, STU_LNAME, STU-MAJOR, ADVISOR-CODE, STU-GPA, STU-HOURS,
STU-CLASS)

MAJOR (MAJOR-CODE, DEPT-CODE, MAJOR-NAME)

DEPT (DEPT-CODE, DEPT-NAME, DEPT-PHONE, COLLEGE-NAME)

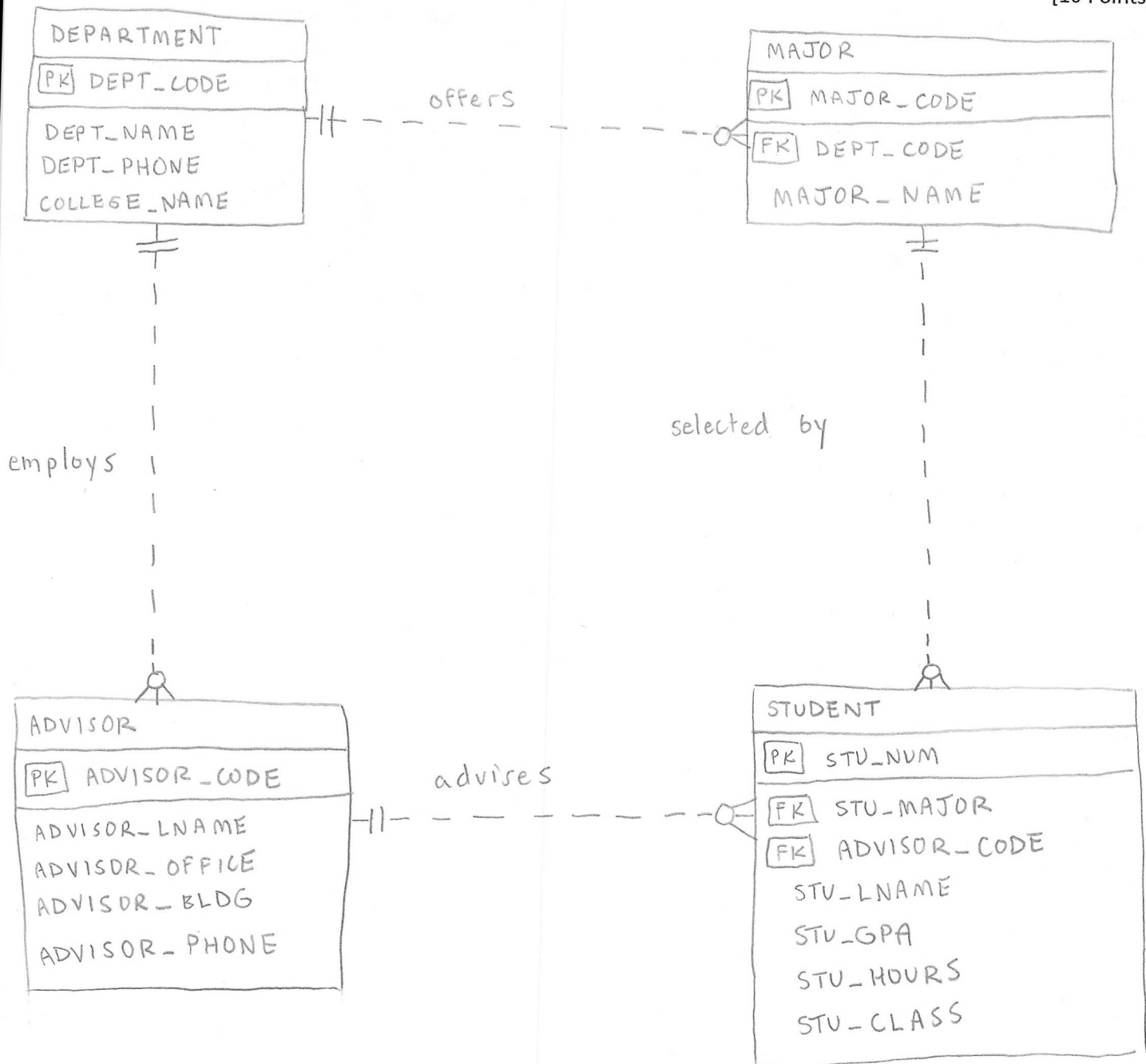
ADVISOR (ADVISOR-CODE, ADVISOR-LNAME, ADVISOR-OFFICE, ADVISOR-BLDG,
ADVISOR-PHONE)



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c. Using the results of parts (a) and (b), draw the Crow's Foot ERD.

[10 Points]



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Question 3:-Use the tables below to answer parts (a) to (d) below.

[15 Points]

Table Name:-

Customer

CUST_NUM	CUST_LNAME	CUST_FNAME	CUST_BALANCE
1000	Smith	Jeanne	1050.11
1001	Ortega	Juan	840.92

Table Name

Invoice

INV_NUM	CUST_NUM	INV_DATE	INV_AMOUNT
8000	1000	23-Mar-16	235.98
8001	1001	23-Mar-16	312.82
8002	1001	30-Mar-16	528.1
8003	1000	12-Apr-16	194.78
8004	1000	23-Apr-16	619.44

Table Name

Customer_2

CUST_NUM	CUST_LNAME	CUST_FNAME
2000	McPherson	Anne
2001	Ortega	Juan
2002	Kowalski	Jan
2003	Chen	George

- a) Write the query that will generate a combined list of customers from the tables CUSTOMER and CUSTOMER_2 that do not include the duplicate customer records. Note that only customer Juan Ortega shows up in both customer tables. [5 Points]

```
SELECT CUST_LNAME, CUST_FNAME FROM CUSTOMER
UNION
SELECT CUST_LNAME, CUST_FNAME FROM CUSTOMER_2;
```

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- b) Write the query that will generate a combined list of customers to include the duplicate customers.
Result should be as follows:- [5 Points]

CUST_LNAME	CUST_FNAME
Smith	Jeanne
McPherson	Anne
Ortega	Juan
Kowalski	Jan
Chen	George

```
SELECT CUST_LNAME, CUST_FNAME FROM CUSTOMER  
UNION ALL
```

```
SELECT CUST_LNAME, CUST_FNAME FROM CUSTOMER-2;
```

- c) Write the query to show the invoice number, customer number, customer name, invoice date and invoice amount for all customers in the CUSTOMER table with a cust_balance of \$1000 or more.

[5 Points]

```
SELECT INV_NUM, CUSTOMER.CUST_NUM, CUST_LNAME, CUST_FNAME, INV_DATE,  
INV_AMOUNT  
FROM INVOICE INNER JOIN CUSTOMER ON INVOICE.CUST_NUM =  
CUSTOMER.CUST_NUM  
WHERE CUST_BALANCE >= 1000;
```