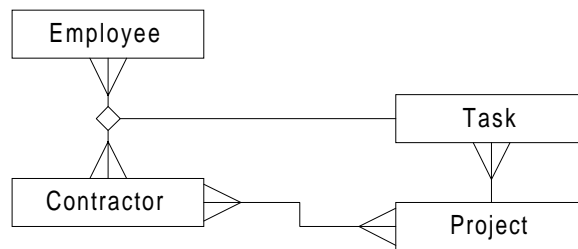


Please answer the following questions in the spaces provided. Question point values are shown in parentheses.

1. (15 points) Consider the following statement: “Although process reengineering is different from the traditional SDLC, it is consistent with the modeling approach associated with the SDLC analysis phase.”

Do you agree or disagree with this statement? Explain.

2. (20 points) Assume you are given the following ER diagram:



You are also given the following information on the entities:

Entity	Number of Entities	Size of Entity Key	Size of "Other"	Total Size
Contractor	50	10 bytes	90 bytes	100 bytes
Employee	250	15 bytes	185 bytes	200 bytes
Project	100	40 bytes	360 bytes	400 bytes

Assume that:

- Each employee is assigned on average 5 tasks.
- Each contractor has on average 2 projects.
- When an employee is assigned a task, two 8-byte date fields are needed – one that stores the start date and a second that stores the finish date.

Given this information, compute the size of each table that would be needed if this data were stored in a relational database. Do not assume that the sizes given above include any fields needed to store the relationships.

3. (16 points) Consider the following spreadsheet used for decision support:

Estimated Model Parameter Values						
Purchase Cost	\$350,000					
Life (years)	8					
Resale Value	\$30,000					
Annual Revenues	\$225,000					
Annual Expenses	\$125,000					
Tax Rate	33.0%					
NPV Discount Factor	15.0%					
Cash Flow Model						
Year	Revenues	Expenses	Depreciation	Taxes	Additional Revenue	Cash Flow
1	\$225,000	\$125,000	\$77,778	\$7,333	\$0	\$92,667
2	\$225,000	\$125,000	\$68,056	\$10,542	\$0	\$89,458
3	\$225,000	\$125,000	\$58,333	\$13,750	\$0	\$86,250
4	\$225,000	\$125,000	\$48,611	\$16,958	\$0	\$83,042
5	\$225,000	\$125,000	\$38,889	\$20,167	\$0	\$79,833
6	\$225,000	\$125,000	\$29,167	\$23,375	\$0	\$76,625
7	\$225,000	\$125,000	\$19,444	\$26,583	\$0	\$73,417
8	\$225,000	\$125,000	\$9,722	\$29,792	\$30,000	\$100,208
					Net Present Value	\$35,590

Using this model, provide a specific example of each of the following analytical modeling approaches: What If, Goal Seek, Sensitivity Analysis, and Risk Analysis. Use specific independent and dependent variables from this spreadsheet. Be sure that your example is worded so that your understanding of each approach is clearly demonstrated.

4. (10 points each part) For each of the following scenarios, create an ER diagram and then convert it to a RSD. Note that the ER diagram might only be a subset of a larger system (that you do not need to model). Clearly state any assumptions and be sure your assumptions do not contradict facts given in the problem statement.
- Members of ABC Gym may make reservations for the use of specific pieces of equipment in the gym. ABC uses a unique member number to identify members. It also stores the member's name, address, and phone number. Each piece of equipment has been assigned a unique identifier. In addition, the description and date of purchase is also stored for each piece of equipment.

Members may have reservations for more than one piece of equipment. When a reservation is made, the date and time of the reservation needs to be recorded and stored in the database. Assume that at any one time, a member may have several reservations on the books for the same piece of equipment (e.g., a member may

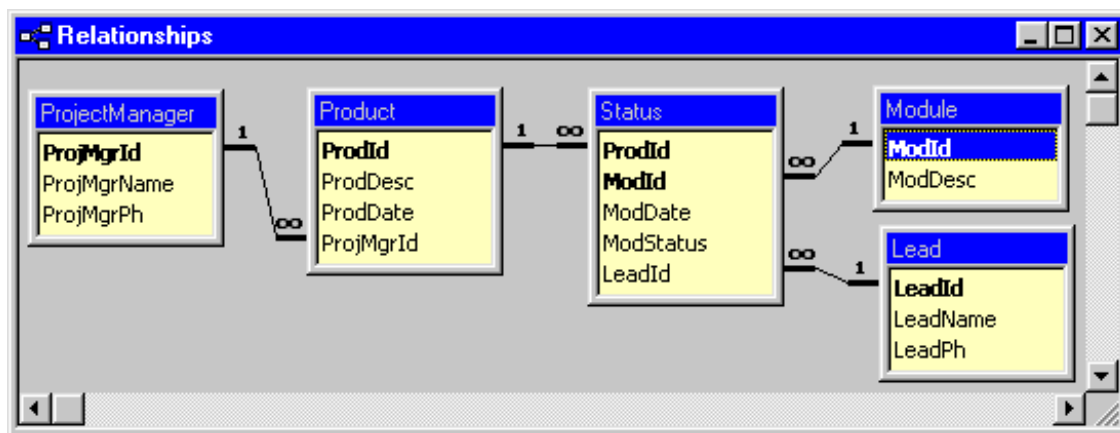
have a reservation for a piece of equipment for both 8 p.m. today and 9 p.m. tomorrow). Also assume that reservations are not deleted from the database after the date/time they took place. That is, they are kept for a longer time period to help support other activities such as billing (which you should not model).

- b. A firm wants to keep track of products purchased by its customers. A unique customer number identifies customers. Other customer information includes name, address, and phone. Products are commodity items such as office supplies (paper, pencils, pens, etc.). Each product has a unique product code but individual items (such as a particular pen) do not have unique serial numbers. Other information about products includes product description and price.

Customers typically purchase many products. When a purchase is made, the date and quantity purchased need to be recorded and stored.

Suppliers supply products. Each supplier has a unique supplier number plus a name and address. Suppliers typically supply many products. However, the firm has a policy of purchasing all of a specific product from one supplier only. This “exclusive supplier” relationship is used to help negotiate lower prices paid to the supplier for a product.

5. (14 points) Consider the following set of relationships as shown in MS Access:



- a. Define the term “referential integrity” and apply your definition to the database described above. That is, if you enforce referential integrity, what would be the benefit in the example above?
- b. Draw the ER diagram that corresponds to the relationships shown above.
6. (15 points) Consider the following statement: “The cost-value evaluation methodology encourages vendors to include desirable features at a price below their market value.”

Do you agree with this statement? Explain.

Answer Key

1. Traditional SDLC systems analysis modeling always starts with the current system. The first step is building a physical model of the current system followed by a logical model of the current system. This logical model of the current system becomes the basis for the new system and this is **inconsistent** with the philosophy of process reengineering. When you use the current system as the basis of the new system, there is an implication that there are many things in the current system that should also exist in the new system. This process tends to generate “evolutionary” systems. With process reengineering, evolution is not the objective – instead, “revolution” is the objective. The main question to be answered is not “how can we improve the existing system?” Instead, the question to be answered is “why do we do this in the first place?” Thus, the modeling approach in the traditional SDLC systems analysis phase is **not** consistent with process reengineering.

2. Contractor: $10+90 = 100$ bytes/contractor x **50** contractors = 5,000 bytes

Employee: $15+185 = 200$ bytes/employee x **250** employees = 50,000 bytes

Task: 10 (contractor key) + 15 (employee key) + 16 (two dates) +
 40 (project key) = **81** bytes/task x **5** tasks/employee x **250** employees
= 101,250 bytes

Project: $40+360 = 400$ bytes/project x **100** projects = 40,000 bytes

Project/Contractor correl table: 40 (project key) + 10 (contractor key)
= **50** bytes/entry x **2** entries/contractor x **50** contractors = 5,000 bytes

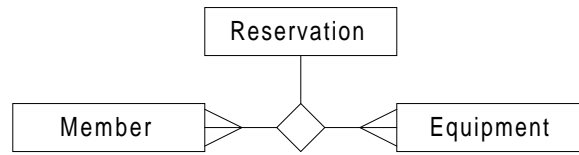
3. **What If:** A correct answer must demonstrate the understanding that a “what if” takes the relationship $y = f(x)$ and, for a given value of x , what is the value of y ? For example, what is the NPV if the tax rate is 25%?

Goal Seek: A correct answer must demonstrate the understanding that a “goal seek” takes the relationship $y = f(x)$ and, for a target value of y , what value of x achieves that target? For example, what tax rate value would produce a NPV value of \$0?

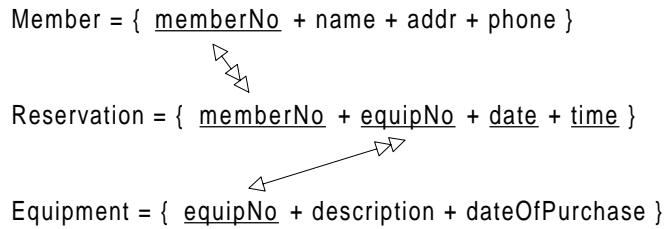
Sensitivity Analysis: A correct answer would demonstrate the understanding of the fact that, given the relationship $y = f(x)$, a sensitivity analysis looks at several different x 's to determine which one impacts y the greatest. Alternatively, a sensitivity analysis could focus on one x and investigate how y changes as the values of x change. For example, if we change the purchase cost, the resale value, and the annual revenues by 10%, which has the greatest impact on NPV?

Risk Analysis: A correct answer would demonstrate that, given the relationship $y = f(x)$, values for one or more x 's would be drawn from a distribution via random sampling. A number of draws would be performed in a Monte Carlo simulation that would generate a number of values for y that would be summarized in another distribution. For example, assume that tax rates might range from 25% to 40% with equal probability. Perform 1,000 trials using tax rates drawn from the distribution, compute 1,000 values for NPV, and then summarize these 1,000 NPV values with a mean and standard deviation.

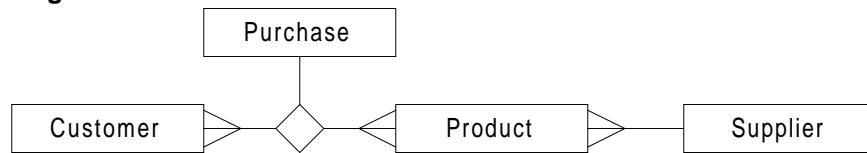
4. a. ER diagram:



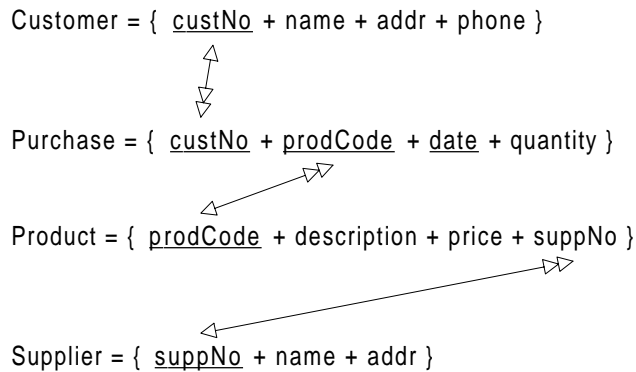
RSD:



b. ER diagram:

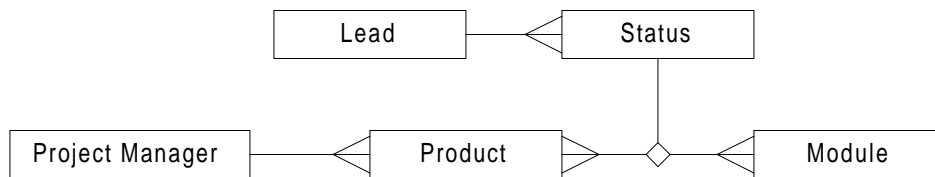


RSD:



5. (a) Referential integrity relates to the fact that foreign keys and correlation tables/associative objects must have something to point to (to reference). In the example, referential integrity ensures that values of ProjMgrId in Product exists in ProjectManager, that values of ProdId in Status exists in Product, that values of ModID in Status exists in Module, and that values of LeadId in Status exists in Lead.

(b)



6. This statement is correct. Assume that you have determined that the market value of feature X at \$10,000. This becomes the desirable feature credit for this feature. If a vendor provides

this feature and charges \$12,000, then this vendor's effective cost would go up by \$2,000 as follows:

$$\text{effective cost} = \$12,000 - \$10,000 = \$2,000$$

Since the winning vendor is the one with the lowest effective cost, then the vendor has reduced the likelihood of being selected.

If the vendor charges \$10,000, the impact on effective cost is zero:

$$\text{effective cost} = \$10,000 - \$10,000 = \$0$$

In this case, then vendor has not reduced the chances of winning, but has not increased them either.

The smart vendor wants to reduce its effective cost. The only way to do this is to charge less than \$10,000 for the feature. If a vendor charges \$8,000, the effective cost is:

$$\text{effective cost} = \$8,000 - \$10,000 = -\$2,000$$

That is, the effective cost is lowered by \$2,000. Thus, it can be concluded that the cost-value methodology encourages vendors to charge below-market prices.