## **Problem 1:**

## **FIRST NORMAL FORM (1NF)**

**Remove multi-valued attributes**. Each row should represent a single atomic fact (one project per row):

| **Dept #** | **Dept Name** | **Location** | **Mgr Name** | **Mgr ID No** | **Tel Extn** | **Cust #** | **Cust Name** | **Date of Complaint** | **Nature of Complaint** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11232 | Soap Division | Cincinnati | Mary Samuel | S11 | 7711 | P10451 | Robert Drumtree | 12/01/1998 | Poor Service |
| 11232 | Soap Division | Cincinnati | Mary Samuel | S11 | 7711 | P10480 | Steven Parks | 14/01/1998 | Discourteous Attendant |

| **Cust #** | **Dept #** | **Cust Name** | **Date of Complaint** | **Nature of Complaint** |
| --- | --- | --- | --- | --- |
| P10451 | 11232 | Robert Drumtree | 12/01/1998 | Poor Service |
| P10480 | 11232 | Steven Parks | 14/01/1998 | Discourteous Attendant |

| **Dept #** | **Dept Name** | **Location** | **Mgr Name** | **Mgr ID No** | **Tel Extn** |
| --- | --- | --- | --- | --- | --- |
| 11232 | Soap Division | Cincinnati | Mary Samuel | S11 | 7711 |
| 11232 | Soap Division | Cincinnati | Mary Samuel | S11 | 7711 |

## **SECOND NORMAL FORM (2NF)**

**Remove partial dependencies**

| **Dept #** | **Cust #** | **Date of Complaint** | **Nature of Complaint** |
| --- | --- | --- | --- |
| 11232 | P10451 | 12/01/1998 | Poor Service |
| 11232 | P10480 | 14/01/1998 | Discourteous Attendant |

| **Dept #** | **Dept Name** | **Location** | **Mgr Name** | **Mgr ID No** | **Tel Extn** |
| --- | --- | --- | --- | --- | --- |
| 11232 | Soap Division | Cincinnati | Mary Samuel | S11 | 7711 |
| 11232 | Soap Division | Cincinnati | Mary Samuel | S11 | 7711 |

## 

| **Cust #** | **Cust Name** |
| --- | --- |
| P10451 | Robert Drumtree |
| P10451 | Steven Parks |

## **THIRD NORMAL FORM (3NF)**

| **Dept #** | **Cust #** | **Date of Complaint** | **Nature of Complaint** |
| --- | --- | --- | --- |
| 11232 | P10451 | 12/01/1998 | Poor Service |
| 11232 | P10480 | 14/01/1998 | Discourteous Attendant |

| **Dept #** | **Dept Name** | **Location** | **Mgr ID No** | **Tel Extn** |
| --- | --- | --- | --- | --- |
| 11232 | Soap Division | Cincinnati | S11 | 7711 |
| 11232 | Soap Division | Cincinnati | S11 | 7711 |

## 

| **Cust #** | **Cust Name** |
| --- | --- |
| P10451 | Robert Drumtree |
| P10451 | Steven Parks |

## 

| **Mgr ID No** | **Mgr Name** |
| --- | --- |
| S11 | Mary Samuel |
| S11 | Mary Samuel |

## 

## 

## 

## 

## **Problem 2:**

## **FIRST NORMAL FORM (1NF)**

**Remove multi-valued attributes**. Each row should represent a single atomic fact (one project per row):

| Emp-No | Emp-Name | Dept | Dept Manager | Proj-id | Proj-Start-Date | Location | Weeks-on-Project |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 005 | Smith | Marketing | Jones | A | 12-93 | Poole | 11 |
| 005 | Smith | Marketing | Jones | B | 06-94 | Plymouth | 15 |
| 005 | Smith | Marketing | Jones | C | 09-94 | Portsmouth | 6 |
| 007 | Bond | Accounts | Bloggs | B | 06-94 | Plymouth | 3 |
| 007 | Bond | Accounts | Bloggs | D | 06-94 | Berlin | 9 |
| 009 | King | Info Systems | Hurne | C | 09-94 | Portsmouth | 10 |
| 010 | Holt | Info Systems | Bloggs | A | 12-93 | Poole | 21 |
| 010 | Holt | Accounts | Bloggs | B | 06-94 | Belfast | 10 |
| 010 | Holt | Accounts | Bloggs | D | 06-94 | Hamburg | 12 |

| Emp-No | Proj-id | Emp-Name | Dept | Dept Manager |
| --- | --- | --- | --- | --- |

| Proj-id | Proj-Start-Date | Location | Weeks-on-Project |
| --- | --- | --- | --- |

## **SECOND NORMAL FORM (2NF)**

**Remove partial dependencies**  
 the composite key is (Emp-No , Proj-id)

Table 1: **Employee**

| **Emp-No** | **Emp-Name** | **Dept** |
| --- | --- | --- |
| 005 | Smith | Marketing |
| 007 | Bond | Accounts |
| 009 | King | Info Systems |
| 010 | Holt | Accounts |

Table 3: **Project**

| **Proj-id** | **Proj-Start-Date** |
| --- | --- |
| **A** | **12-93** |
| **B** | **06-94** |
| **C** | **09-94** |
| **D** | **06-94** |

Table 4: **Employee\_Project\_Assignment**

| **Emp-No** | **Proj-id** | **Location** | **Weeks-on-Project** |
| --- | --- | --- | --- |
| **005** | **A** | **Poole** | **11** |
| **005** | **B** | **Plymouth** | **15** |
| **005** | **C** | **Portsmouth** | **6** |
| **007** | **B** | **Plymouth** | **3** |
| **007** | **D** | **Berlin** | **9** |
| **009** | **C** | **Portsmouth** | **10** |
| **010** | **A** | **Poole** | **21** |
| **010** | **B** | **Belfast** | **10** |
| **010** | **D** | **Hamburg** | **12** |

## **THIRD NORMAL FORM (3NF)**

**Remove transitive dependencies**

| **Dept** | **Dept Manager** |
| --- | --- |
| **Marketing** | **Jones** |
| **Accounts** | **Bloggs** |
| **Info Systems** | **Hurne** |