**Exercise 2**

1. Set Theoretic Operations
   1. Union: {(Bill Smith 22), (Sally Green 2), (Mary Keen 23), (Tony Jones 32), (Forrest Gump 36), (DonJuan DeMarco 27)}
   2. Difference: {(Bill Smith 22), (Mary Keen 23), (Tony Jones 32), (Forrest Gump 36), (DonJuan DeMarco 27)}
   3. Intersection: {(Sally Green 2)}
2. Cartesian product
   1. RxS: {(Bill Smith 22, Steak Ice Cream), (Bill Smith 22, Lobster Cheesecake), (Mary Keen 23, Steak Ice Cream), (Mary Keen 23, Lobster Cheesecake), (Tony Jones 32, Steak Ice Cream), (Tony Jones 32, Lobster Cheesecake)}
3. Selection and Projection
   1. Selection σ:
      1. Select only those Employees in the CS department: {(Smith 400 CS Assistant), (Brown 420 CS Associate)}
      2. Select only those Employees with last name Smith who are assistant professors: {(Smith 400 CS Assistant)}
      3. Select only those Employees who are either Associate Professors or in the Economics department: {(Jones 220 Econ Adjunct), (Green 160 Econ Assistant), (Brown 420 CS Associate), (Smith 500 Fin Associate)}
      4. Select only those Employees who are not in the CS department or Adjuncts: {(Green 160 Econ Assistant), (Smith 500 Fin Associate)}
   2. Projection π:
      1. Project only the names and departments of the employees: {(Smith CS), (Jones ECON), (Green Econ), (Brown CS), (Smith Fin)}
   3. Combining Selection and Projection:
      1. Show the names of all employees working in the CS department:  
          π name ( σDept = 'CS' (EMP) ): {Smith, Brown}
      2. Show the name and rank of those Employees who are not in the CS department or Adjuncts:  
         π name, rank (σ⌐ (Rank = 'Adjunct' V Dept = 'CS') (EMP) ): {(Green Assistant), (Smith Associate)}
   4. Aggregate Function
      1. Minimum Salary: 35000
      2. Average Salary: 51000
      3. Nr of employees in CS: 2
      4. Total payroll for Economics: 85000
   5. Join
      1. Find all information on every employee including their department info:  
         Name Office Dept Salary Dept MainOffice Phone  
         Smith 400 CS 45000 CS 404 555-1212  
         Jones 220 Econ 35000 Econ 200 555-1234  
         Green 160 Econ 50000 Econ 200 555-1234  
         Brown 420 CS 65000 CS 404 555-1212  
         Smith 500 Fin 60000 Fin 501 555-4321
      2. Find all information on every employee including their department info where the employee works in an office numbered less than the department main office:  
         Name Office Dept Salary MainOffice Phone  
         Smith 400 CS 45000 404 555-1212  
         Green 160 Econ 50000 200 555-1234  
         Smith 500 Fin 60000 501 555-4321
   6. Natural Join
      1. EMP \* DEPART  
         Name Office Dept Salary MainOffice Phone  
         Smith 400 CS 45000 404 555-1212  
         Jones 220 Econ 35000 200 555-1234  
         Green 160 Econ 50000 200 555-1234  
         Brown 420 CS 65000 404 555-1212  
         Smith 500 Fin 60000 501 555-4321
   7. Outer Join
      1. Show PEOPLE left outer join MENU  
         Name Age Food Day  
         Alice 21 Hamburger Tuesday  
         Bill 24 Pizza Monday  
         Carl 23 Beer   
         Dina 19 Shrimp
      2. Show PEOPLE right outer join MENU  
         Name Age Food Day  
         Alice 21 Hamburger Tuesday  
         Bill 24 Pizza Monday  
          Chicken Wednesday   
          Pasta Thursday   
          Tacos Friday
      3. Show PEOPLE full outer join MENU  
         Name Age Food Day  
         Alice 21 Hamburger Tuesday  
         Bill 24 Pizza Monday  
         Carl 23 Beer   
         Dina 19 Shrimp

Chicken Wednesday   
 Pasta Thursday   
 Tacos Friday