We have the database consist of 5 relations:

Product (ProductCode, Name, PurchasePrice, SellPrice, Type, SupplierCode)

Supplier (SupplierCode, SupplierName, Address)

Employee (EmloyeeID, FullName, Gender, BirthDate, Address)

Invoice (InvoiceID, SellDate, EmployeeID)

InvoiceLine(ProductCode, InvoiceID, Quantity)

EXERCISE 1: WRITE EXPRESSIONS OF RELATIONAL ALGEBRA TO ANSWER THE FOLLOWING QUERIES:

1. Find name and sell price of televisions supplied by Samsung.

R1 := πSupplierCode ( σSupplierName = ‘Samsung’ ( Supplier ))

R2 := πName,SellPrice (σType = ‘Television’ ( R1 ⋈ Product ))

1. Find name and address of all suppliers who supply television product.

R1 := πSupplierCode (σType = ‘Television’ (Product))

R2 := πSupplierName,Address  ( R1 ⋈ SupplierCode )

1. Find name of all employee who were born in 1983.

π FullName (σBirthDate >= ‘01/01/1983’ ∧ BirthDate <= ‘31/12/1983’ ( Employee ))

1. Find name and type of all products sold in ‘23/05/2018’.

R1 := πProductCode (σSellDate = ‘23/05/2018’ ( Invote ⋈ InvoiceLine ))

R2≔ πName,Type ( R1 ⋈ Product )

1. Find name of female employees who sold televisions.  
   R1 := σGender = ‘Female’ ( Product ⋈ InvoiceLine ⋈ Invoice ⋈ Employee))  
   R2 := σType = ‘Televison’ ( Product ⋈ InvoiceLine ⋈ Invoice ⋈ Employee))  
   R3 := πFullName ( R1 ∧ R2 )
2. Find name and address of suppliers who supply both television and mobile.  
   R1 := πSupplierCode , Type (σType = ’Television’ (Product))  
   R2 := πSupplierCode ,Type (σType = ’Mobile’ (Product))  
   R3 ≔ πR1.SupplierCode (R1R1.SupplierCode = R2.SupplierCode ∧ R1.Type ≠ R2.Type ⋈ R2 )  
   R4≔ρ R4( SupplierCode ) ( R3 )  
   R5≔π­SupplierName, Address ( R4 ⋈ Supplier )
3. List name and price of all product sold by employee “Nguy n Văn A” in April 2018.  
   R1 := πEmployeeID (σFullName = ‘Nguyễn Văn A’ (Employee))

R2 := πInvoiceID (σSellDate ≥ ‘01/08/2018’∧ σSellDate ≤ ‘31/08/2018' ( Invoice ⋈ R1 ))  
R3≔πProductCode ( R2 ⋈ InvoiceLine)  
R4≔πName,SellPrice ( R3 ⋈ Product)

1. Find name and price of all mobile products of Samsung sold in April 2018.

R1 := πProductCode (σSellDate ≥ ‘01/08/2018’∧ σSellDate ≤ ‘31/08/2018' ( Invoice ⋈ InvoiceLine ))

R2 := πSupplierCode (σSupplierName=’Samsung’ ( R1 ⋈ Supplier ⋈ Product ))

R3 := πName,SellPrice (σType = “Mobile” ( R2 ⋈ Product))

1. Find the product with highest SellPrice.

R1 := πName,SellPrice (Product)

R2 := ρ R2(Name2,SellPrice2) ( R1 )

R3 := πName,SellPrice ( R1SellPrice<SellPrice2 ⋈ R2)

R4 := πName,SellPrice ( R1 − R3 )

1. Find the amount (quantity \* sellPrice) of each invoice line of product sold in 30/04/2018.

R1 := σSellDate=’30/04/2018’ ( Invoice ⋈ InvoiceLine )

R2 :=πInvoiceID,Amount=Quantity\*SellPrice ( R1 ⋈ Product)