CSC261 Milestone3 Task A

We have 5 relations in our project:

1. R1=Customer={Customer_ID, Customer_First_Name, Customer_Last_Name}
2. R2=Product={Product_ID, Product_Price, Product_Name}
3. R3=Invoice={Invoice_ID, Customer_ID, Status}
4. R4=Contact_Info={Customer_ID, Customer_Address, Customer_State, Customer_Zip, Customer_Phone}
5. R5=Include_Product={Product_ID, Invoice_ID, Product_Quantity}

Functional Dependency=F={Customer_ID -> {Customer_First_Name, Customer_Last_Name}; Product_ID -> {Product_Price, Product_Name}; Invoice_ID -> {Customer_ID, Status}; {Customer_ID,Customer_Address} -> {Customer_State, Customer_Zip, Customer_Phone}; Product_ID -> {Invoice_ID, Product_Quantity}}

Prime attributes: Customer_ID, Product_ID, {Customer_ID, Customer_Address}, Invoice_ID, {Product_ID, Invoice_ID}.

From the 5 functional dependencies above, each of them is in BCNF.
In the first place, there is no multi-valued attribute in the relations above. Therefore, all the functional dependencies are in First Normal Form.
In the second place, based one the First Normal Form, from the functional dependency above, every non-prime attribute is fully functionally dependent on the primary key. Therefore, all the functional dependencies are in Second Normal Form.
In the third place, based on the Second Normal Form, from the functional dependency above, there is no non-prime attribute that is transitively dependent on the primary key. Therefore, all the functional dependencies are in Third Normal Form.
Finally, based on the Third Normal Form, from the functional dependency above, every functional dependency is nontrivial in the relations, and then every primary key is a super key in each of their relations respectively. Therefore, all the functional dependencies are in BCNF.