Part One

1. **As he shows you the spreadsheet, having just signed your consulting agreement, he asks what you think of it. How do you reply?**
   I would tell my customer that I think he did a good job of trying to track the data. I would ask him if all the Tag Numbers are unique and if a package ID can be installed on a tag number more than once. I would then tell him that I am confident we can create a database for his needs.

2. **Put his data in 1NF and display it.**

TagNumber	PackageID	InstallDate	SoftwareCostUSD
32808	AC01	13-Sep-2005	754.95
32808	DB32	3-Dec-2005	380.00
37691	DB32	15-Jun-2005	380.00
57772	DB33	27-May-2005	412.77
32808	WP08	12-Jan-2006	185.00
37691	WP08	15-Jun-2005	227.50
57222	WP08	27-May-2005	170.24
59836	WP09	30-Oct-2005	35.00

3. **What is the primary key?**
   I am going to assume that the CEO told me that one Package ID per tag number. This way my primary key will be (TagNumber and PackageID).

Part Two

4. **Display the new table.**

57222	WP08	27-May-2005	170.24	QuickBooks Pro	HP Z400
57772	DB33	27-May-2005	412.77	Microsoft Project	HP Z800
59836	WP09	30-Oct-2005	35.00	NIS 2005	Dell Optiplex
77740	WP09	27-May-2005	35.00	NIS 2005	Dell Optiplex

5. **Identify and document all the functional dependencies.**
   - We see a functional dependency with “TagNumber” and “ComputerModel”; this is because it is not possible for there to be another “ComputerModel” tuple for a specific “TagNumber”. In other words, the tag number will always be associated with the same computer.

- There is a FD with the “PackageID” and “PackageName”. The Software package gets brought into the business and is assigned a PackageID. Therefore, a Package ID will always have the Package Name.

6. **Explain why this new table is not in third normal form**

   The simplest statement I found to explain Third normal is in our book; it states, “…for each nontrivial FD, either the left side is as super key, or the right side consists of prime attributes only.” (pg. 102) This means that in a table we have if our superkey is Tag Number and Package ID, the date is trivial whereas computer is a FD of the tag and the name of the software is a FD of Package ID. Also, the price has no FD. If we break the table into smaller tables, there is no dependency-preservation to either the price or the date of installation. Most importantly in this table someone can change, for example, the Computer Model in one row. This would mean that one tag number can potentially have multiple computer models.

Part III

Assets	
TagNumber	**ComputerModel**
32080	HP Z400
37691	Levnovo ThinkCentre
57222	HP Z400
57772	HP Z800
59836	Dell Optiplex
77740	Dell Optiplex

SoftwarePackages	
PackageID	**PackageName**
AC01	Adobe CS4
DB32	Office Pro Plus
WP08	QuickBooks Pro
DB33	Microsoft Project
WP09	NIS 2005

SoftwareInstalls			
TagNumber	PackageID	InstallDate	SoftwareCostUSD
32808	AC01	13-Sep-2005	754.95
32808	DB32	3-Dec-2005	380.00
32808	WP08	12-Jan-2006	185.00
37691	DB32	15-Jun-2005	380.00
37691	WP08	15-Jun-2005	227.50
57222	WP08	27-May-2005	170.24
57772	DB33	27-May-2005	412.77
59836	WP09	30-Oct-2005	35.00
77740	WP09	27-May-2005	35.00

7. **Identify all primary keys (determinants) for all tables.**
   In our Assets table, the primary key is the TagNumber, in SoftwarePackages the primary key is the PackageID, and in the SoftwareInstalls the primary key is (TagNumber and PackageID).

8. **Identify all functional dependencies for all tables.**
   In the Assets table, the FD is that each Tag is unique and the computer name is its attribute. This is the same relation in SoftwarePackages, we see that PackageID is unique and the PackageName is its attribute. Software Installs uses two foreign keys (tagNumber and PackageID) as its primary key, with the attributes being InstallDate and SoftwareCostUSD.

9. **Explain why the new tables are in third normal form.**
   The new tables provide the attributes that are associated with the 3NF. First, the primary keys are the determinates of the data in the rest of the table. There are no attribute data in any of the tables that are not in direct relation to the primary keys. Second, we have no add/delete data integrity issues. We cannot change the model, software, or Tag number in the SoftwareInstalls table. If we delete a row in the SoftwareInstalls table it will not affect the other rows in that table because the primary keys are from the data in another table. Finally, we cannot add rows to the SoftwareInstalls table that are not already in the other two tables. This will prevent the insertion of undocumented data.

10. Draw an ERD representing the tables