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Lab 9 Questions 1 and 3

1. Functional dependencies:

People:	$\text{pid} \rightarrow \text{firstName, lastName, age}$
Engineers:	$\text{pid} \rightarrow \text{highestDegree, favoriteVideoGame}$
Astronauts:	$\text{pid} \rightarrow \text{yearsFlying, goldHandicap, spouseName}$
FlightControlOperators:	$\text{pid} \rightarrow \text{chairPreference, preferredDrink, hangoverCure}$
FlewOn:	$\text{pid, scId} \rightarrow$
SpaceCrafts:	$\text{scId} \rightarrow \text{craftName, tailNumber, weightTons, fuelType, crewCapacity}$
HasSystem:	$\text{scId, sysId} \rightarrow$
Systems:	$\text{sysId} \rightarrow \text{systemName, systemDescription, systemCostUSD}$
HasParts:	$\text{partId, sysId} \rightarrow$
Parts:	$\text{partId} \rightarrow \text{partName, partDescription, partCostUSD}$
Catalog:	$\text{supId, partId} \rightarrow$
Suppliers:	$\text{supId} \rightarrow \text{supplierName, supplierAddress, paymentTerms}$

3. This database is in third normal form, and even in Boyce-Codd normal form, since each table is, by itself, in Boyce-Codd normal form. Each table is in first normal form because all intersections between row and column contain no further structure, thus making them atomic. Each table is in second normal form because none experience partial key dependencies, meaning that all parts of each primary key functionally determines every other field in the entity. Each table is in third normal form because no table experiences multiple key dependencies, meaning that there are no functional dependencies in any table for which the primary key is not the determinant. Lastly, each table is in Boyce-Codd normal form because none experience transitive dependencies, meaning that there are no cases where the primary key both determines and is determined by another candidate key in the table. Since every table in this database satisfies all of the requirements for being in Boyce-Codd normal form, then the database itself must also be in Boyce-Codd normal form.