**Normalization Problem to solve**

**Venmo**

*This single relation contains all the attributes of our database*:

Venmo (TransID, TransAmount, TransType, TransDate, TransMsg, TransAudience, UserID, UserFirstName, UserLastName, UserEmail, UserPassword, UserAccountBalance, BankLoginID, BankLoginPassword, BankAccountID, BanAccountName, BankAccountNo, BankAccountRoutingNo, BankCardID, BankCardNo, BankCardExpirationDate, BankCardSecurityNo, BankCardZipNo, UserIDFriend, ProgressStatus)

*These are the functional dependencies that are present in the above relation:*

* TransID → TransAmount, TransType, TransDate, TransMsg, TransAudience
* UserID → UserFirstName, UserLastName, UserEmail, UserPassword, UserAccountBalance
* BankAccountID → BankLoginPassword, BankLoginID, BankAccountName, BankAccountNo, BankAccountRoutingNo
* BankCardID → BankCardNo, BankCardExpirationDate, BankCardSecurityNo, BankCardZipNo
* UserID, TransID → UserIDFriend, ProgressStatus

To do a 3NF decomposition, we simply take each FD and make it into its own relation. We would need one more relation if the primary key was not contained anywhere. None of the 5 relations contains the primary key then R6 containing the primary key is required. From Left Middle Right method, the primary key is (TransID UserID BankAccountID BankCardID)

* R1 (TransID, TransAmount, TransType, TransDate, TransMsg, TransAudience)
* R2 (UserID, UserFirstName, UserLastName, UserEmail, UserPassword, UserAccountBalance)
* R3 (BankAccountID, BankLoginPassword, BankLoginID, BankAccountName, BankAccountNo, BankAccountRoutingNo)
* R4 (BankCardID, BankCardNo, BankCardExpirationDate, BankCardSecurityNo, BankCardZipNo)
* R5 (UserID, TransID, UserIDFriend, ProgressStatus)
* R6 (TransID, UserID BankAccountID BankCardID)