# Week 11 – Normalization Example

Complete the UNF, 1NF, 2NF and 3NF for the attached document. You may work in partners and this is an OPEN book quiz.

A screenshot of a cell phone

Description automatically generated

# Solution

Note: that this is just one pathway to get to the ultimate solution. You may have different 1NF and 2NF but you should have the same 3NF solution as here.

## UNF (candidate keys and repeating groups identified)

Decided to use RECEIPT as the main item

RECEIPT [ **ReceiptNo**, Date, (DateFrom, DateTo, AmountRequired), (PropID, PropAddress, PropCity, PropProv, PropPC), ReceivedBy, AmountReceived, PaidMethod, isSigned]

**Notes**:

* isSigned is going to be a Boolean field replacing the Stamp.
* Rental Property should be split into separate fields for database use
* Added PropertyID in case the owner has more than one rental property
* Balance Due is a calculated field
* The property information could be considered a repeating group (If you choose not to, that is okay, because transitive dependencies would result in the same change).
* Paid Method is also a repeating group
* Received By could potentially be thought of as a repeating group if the owner always receives the rent directly.
* We can assume that rent may not all be paid at once and multiple payments could be made. Therefore, the rental period could be considered a repeating group
* We can assume that part of the rent can be paid by one payment method while the rest paid by a different payment method

## 1NF (repeating values or non-atomic fields)

A step by step walkthrough:

Step 1 – remove payments as repeating value (non-atomic) and break payment methods out as repeating group

RECEIPT [ **ReceiptNo**, Date, (DateFrom, DateTo, AmountRequired), (PropID, PropAddress, PropCity, PropProv, PropPC), ReceivedBy, isSigned]

PAIDMETHODS [ **ReceiptNo FK**, **PayMethodID FK**, AmountReceived ]

PAYMETHODS [ **PayMethodID**, PayMethod ]

Step 2 – Remove Reason for Rent out as repeating group (when multiple payments made)

RECEIPT [ **ReceiptNo**, Date, (PropID, PropAddress, PropCity, PropProv, PropPC), ReceivedBy, isSigned]

PAIDMETHODS [ **ReceiptNo FK**, **PayMethodID FK**, AmountReceived ]

PAYMETHODS [ **PayMethodID**, PayMethod ]

RENT\_PERIOD [ **RentalPeriodID**, DateFrom, DateTo, AmountRequired, PropID FK]

Step 3 – Remove Property information as Repeating Group

RECEIPT [ **ReceiptNo**, Date, PropID FK, ReceivedBy, isSigned]

PAIDMETHODS [ **ReceiptNo FK**, **PayMethodID FK**, AmountReceived ]

PAYMETHODS [ **PayMethodID**, PayMethod ]

RENT\_PERIOD [ **RentalPeriodID**, DateFrom, DateTo, AmountRequired, PropID FK]

PROPERTY [ **PropID**, PropAddress, PropCity, PropProv, PropPC ]

**Notes**:

* PayMethodID is added as a surrogate key to make the FK an integer rather than a string

## 2NF (Partial Dependencies)

RECEIPT [ **ReceiptNo**, Date, PropID FK, ReceivedBy, isSigned]

PAIDMETHODS [ **ReceiptNo FK**, **PayMethodID FK**, AmountReceived ]

PAYMETHODS [ **PayMethodID**, PayMethod ]

RENT\_PERIOD [ **RentalPeriodID**, DateFrom, DateTo, AmountRequired, PropID FK]

PROPERTY [ **PropID**, PropAddress, PropCity, PropProv, PropPC ]

NO CHANGE AS THERE ARE NO PARTIAL DEPENDENCIES

## 3NF (Transitive Dependencies)

RECEIPT [ **ReceiptNo**, Date, PropID FK, ReceivedBy, isSigned]

PAIDMETHODS [ **ReceiptNo FK**, **PayMethodID FK**, AmountReceived ]

PAYMETHODS [ **PayMethodID**, PayMethod ]

RENT\_PERIOD [ **RentalPeriodID**, DateFrom, DateTo, AmountRequired, PropID FK]

PROPERTY [ **PropID**, PropAddress, PropCity, PropProv, PropPC, MonthlyRentAmount ]

Only change was added MonthlyRentAmount to the PROPERTY entity.

**Notes**: AmountRequired required might be transitive to RentalPeriod as it would be affected by the PropertyID. However, because Rent can change over time, it is important that the current rent and rent on the date of the receipt are separated into 2 fields.