Question 1

customerNumber uniquely identifies customer
partNumber uniquely identifies part
customerNumber + orderTime + orderDate is unique to each order
employee uniquely identifies an employer
Each partNumber has one type, cageCode and unitPrice

UNF (0NF)

customerNumber	customerName	customerType	orderDate	orderTime	employeeName	partNumber	partName	partType	cageCode	quantityOrdered	unitPrice
H G54 587	Jeff Peterson	Consumer	7/1/2024	10:30am	D. Harrison	(10654, 10456, 10776, 10657)	(Float Control, Modulator, Hose Assembly, Float Assembly)	(Plumbing, Electrical, Plumbing, Plumbing)	(0143, H433, G413, G413)	(4, 3, 7, 5)	(12, 7, 9, 10)

still has repeating groups of sets

1NF

customerNumber	customerName	customerType	orderDate	orderTime	employeeName	partNumber	partName	partType	cageCode	quantityOrdered	unitPrice
H G54 587	Jeff Peterson	Consumer	7/1/2024	10:30am	D. Harrison	10654	Float Control	Plumbing	0143	4	12
H G54 587	Jeff Peterson	Consumer	7/1/2024	10:30am	D. Harrison	10456	Modulator	Electrical	H433	3	7
H G54 587	Jeff Peterson	Consumer	7/1/2024	10:30am	D. Harrison	10776	Hose Assembly	Plumbing	0143	7	9
H G54 587	Jeff Peterson	Consumer	7/1/2024	10:30am	D. Harrison	10657	Float Assembly	Plumbing	0143	5	10

customerName and customerType depends only on costomerNumber
employeeNumber depends only on customerNumber, orderDate and orderTime
partName, partType, cageCode and unitPrice depends only on partNumber

2NF

customer

customerNumber	customerName	customerType
H G53587	Jeff Peterson	Consumer

employee

employeeName
D.Harrison

order

customerNumber	orderDate	orderTime	employeeName
H G54587	7/1/2024	10:30am	D.Harrison

part

partNumber	partName	partType	cageCode	unitPrice
10654	Float Control	Plumbing	G143	12
10456	Modulator	Electrical	H433	7
10776	Hose Assembly	Plumbing	G143	9
10657	Float Assembly	Plumbing	G143	10

orderline

customerNumber	orderDate	orderTime	partNumber	quantityOrdered
H G54587	7/1/2024	10:30am	10654	4
H G54587	7/1/2024	10:30am	10456	3
H G54587	7/1/2024	10:30am	10776	7
H G54587	7/1/2024	10:30am	10657	5

There is no partial Dependency
And after checking there is no transitive dependency so no non-key attribute
depending on another non-key attribute, therefore the 3NF only needs to add the FK
some of the information inside order and orderline are italicized as they ask as foreign
key

3NF

customer

customerNumber	customerName	customerType
H G53587	Jeff Peterson	Consumer

employee

employeeName
D.Harrison

order

customerNumber	orderDate	orderTime	employeeName
H G54587	7/1/2024	10:30am	D.Harrison

part

partNumber	partName	partType	cageCode	unitPrice
10654	Float Control	Plumbing	G143	12
10456	Modulator	Electrical	H433	7
10776	Hose Assembly	Plumbing	G143	9
10657	Float Assembly	Plumbing	G143	10

orderline

customerNumber	orderDate	orderTime	partNumber	quantityOrdered
H G54587	7/1/2024	10:30am	10654	4
H G54587	7/1/2024	10:30am	10456	3
H G54587	7/1/2024	10:30am	10776	7
H G54587	7/1/2024	10:30am	10657	5

Question 2

staffNo uniquely identifies a therapist
staffNo + appointmentDate + appointmentTime uniquely identifies an appointment
staffNo + appointmentDate shows branchNo. each therapist stays at a specific
branch each day.

0NF: no need for showing the from, original table is atomic and already in 1NF.

1NF --> 2NF
staffNo corresponds to therapist Name showing repeats
patNo corresponds to patName shoiwng repeats
BranchNo repeats based on staffNo + appointmentDate

1NF

staffNo	therapistName	patNo	patName	appointment Date	time	branchNo
S1011	Fred Smith	P100	Lily White	9/12/2022	10:00	M15
S1011	Fred Smith	P105	Jill Baker	9/12/2022	12:00	M15
S1024	Heidi Pierce	P108	Andy McKee	9/12/2022	10:00	Q10
S1024	Heidi Pierce	P108	Andy McKee	9/14/2022	14:00	Q10
S1032	Richard Levin	P105	Jill Baker	9/14/2022	16:30	M15
S1032	Richard Levin	P110	Jimmy Winter	9/15/2022	18:00	B13

2NF

therapist

staffNo	therapistName
S1011	Fred Smith
S1024	Heidi Pierce
S1032	Richard Levin

patient

patNo	patName
P100	Lily White
P105	Jill Baker
P108	Andy McKee
P110	Jimmy Winter

therapist_day

staffNo	appointmentDate	branchNo
S1011	9/12/2022	M15
S1024	9/12/2022	Q10
S1024	9/14/2022	Q10
S1032	9/14/2022	M15
S1032	9/15/2022	B13

appointment

staffNo	appointmentDate	appointmentTime	patNo
S1011	9/12/2022	10:00	P100
S1011	9/12/2022	12:00	P105
S1024	9/12/2022	10:00	P108
S1024	9/14/2022	14:00	P108
S1032	9/14/2022	16:30	P105
S1032	9/15/2022	18:00	P110

Now in 2NF, therapist name and patient name do not repeat as they gets stored in
therapist and patient
branch Number is stored not dependending on appointment row, but directly stored
one based on therapist day

No transitive dependencies remain in the table, so only change the FK to italic in 3NF

3NF

therapist

staffNo	therapistName
S1011	Fred Smith
S1024	Heidi Pierce
S1032	Richard Levin

patient

patNo	patName
P100	Lily White
P105	Jill Baker
P108	Andy McKee
P110	Jimmy Winter

therapist_day

staffNo	appointmentDate	branchNo
S1011	9/12/2022	M15
S1024	9/12/2022	Q10
S1024	9/14/2022	Q10
S1032	9/14/2022	M15
S1032	9/15/2022	B13

appointment

staffNo	appointmentDate	appointmentTime	patNo
S1011	9/12/2022	10:00	P100
S1011	9/12/2022	12:00	P105
S1024	9/12/2022	10:00	P108
S1024	9/14/2022	14:00	P108
S1032	9/14/2022	16:30	P105
S1032	9/15/2022	18:00	P110

Question 3

eNo uniquely identifies a eName
contract should uniquely identify a contract and applies to only one specific event
multiple employees could apply to each contract
eventNo corresponds to eventLoc as each event only can occur at one location

0NF: no need for showing the from, original table is atomic and already in 1NF.

1NF --> 2NF
eName depends only on eNo showing repeats
eventLoc only depends on eventNo and eventNo only depends on contractNo

1NF

eNo	contractNo	hours	eName	eventNo	eventLoc
1135	C1024	16	Smith J	H25	Queens
1057	C1024	24	Hocine D	H25	Queens
1068	C1025	28	White T	H4	Yonkers
1135	C1025	15	Smith J	H4	Yonkers
1135	C1026	10	Smith J	H25	Queens

2NF

employee

eNo	eName
1135	Smith J
1057	Hocine D
1068	White T

contract

contractNo	eventNo	eventLoc
C1024	H25	Queens
C1025	H4	Yonkers
C1026	H25	Queens

work

eNo	contractNo	hours
1135	C1024	16
1057	C1024	24
1068	C1025	28
1135	C1025	15
1135	C1026	10

For 2NF, there is a transitive dependency occur in contract. For 3NF, there is no FK
after splitting up information in contract

3NF

employee

eNo	eName
1135	Smith J
1057	Hocine D
1068	White T

event

eventNo	eventLoc
H25	Queens
H4	Yonkers

contract

contractNo	eventNo
C1024	H25
C1025	H4
C1026	H25

work

eNo	contractNo	hours
1135	C1024	16
1057	C1024	24
1068	C1025	28
1135	C1025	15
1135	C1026	10