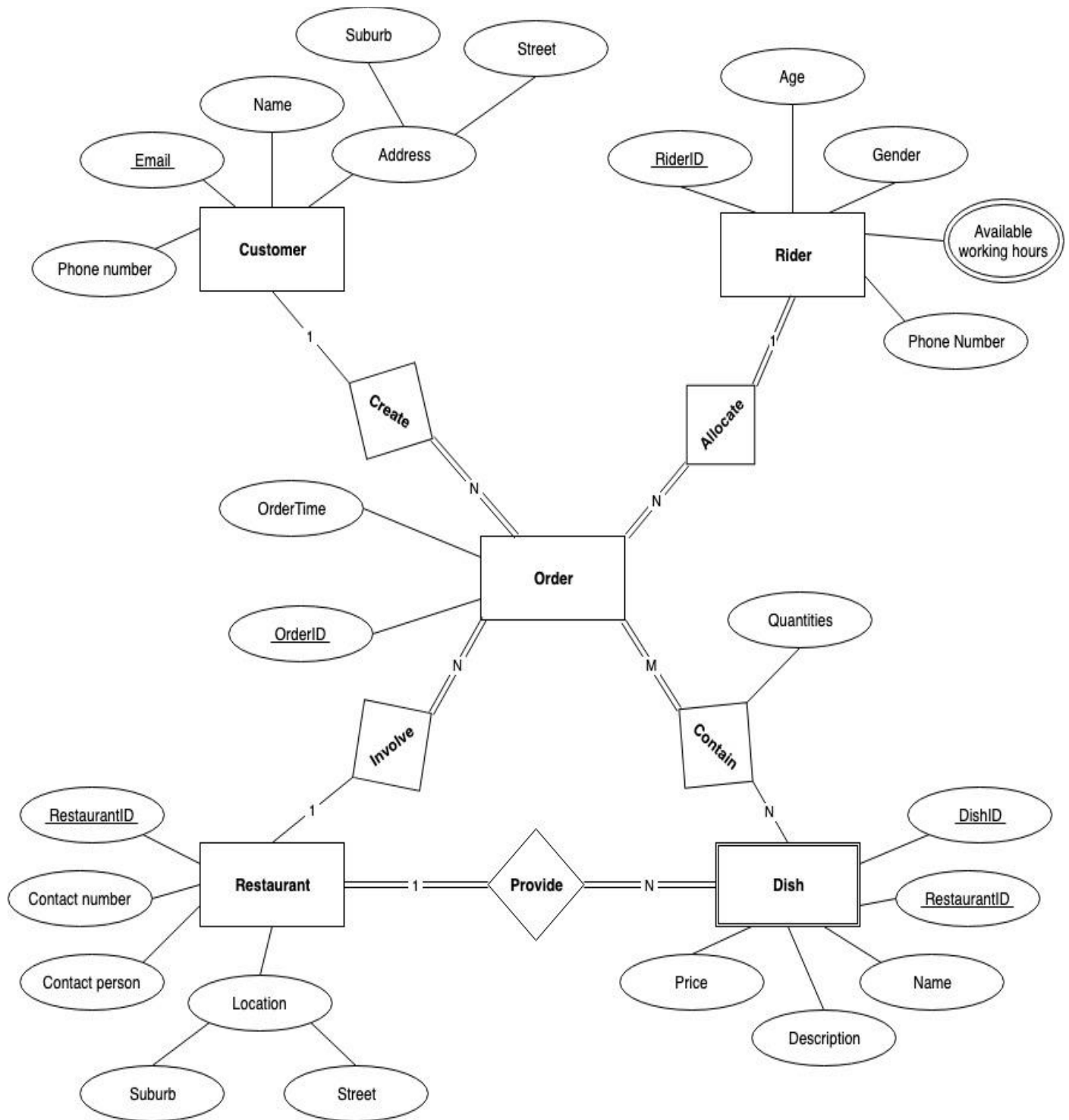
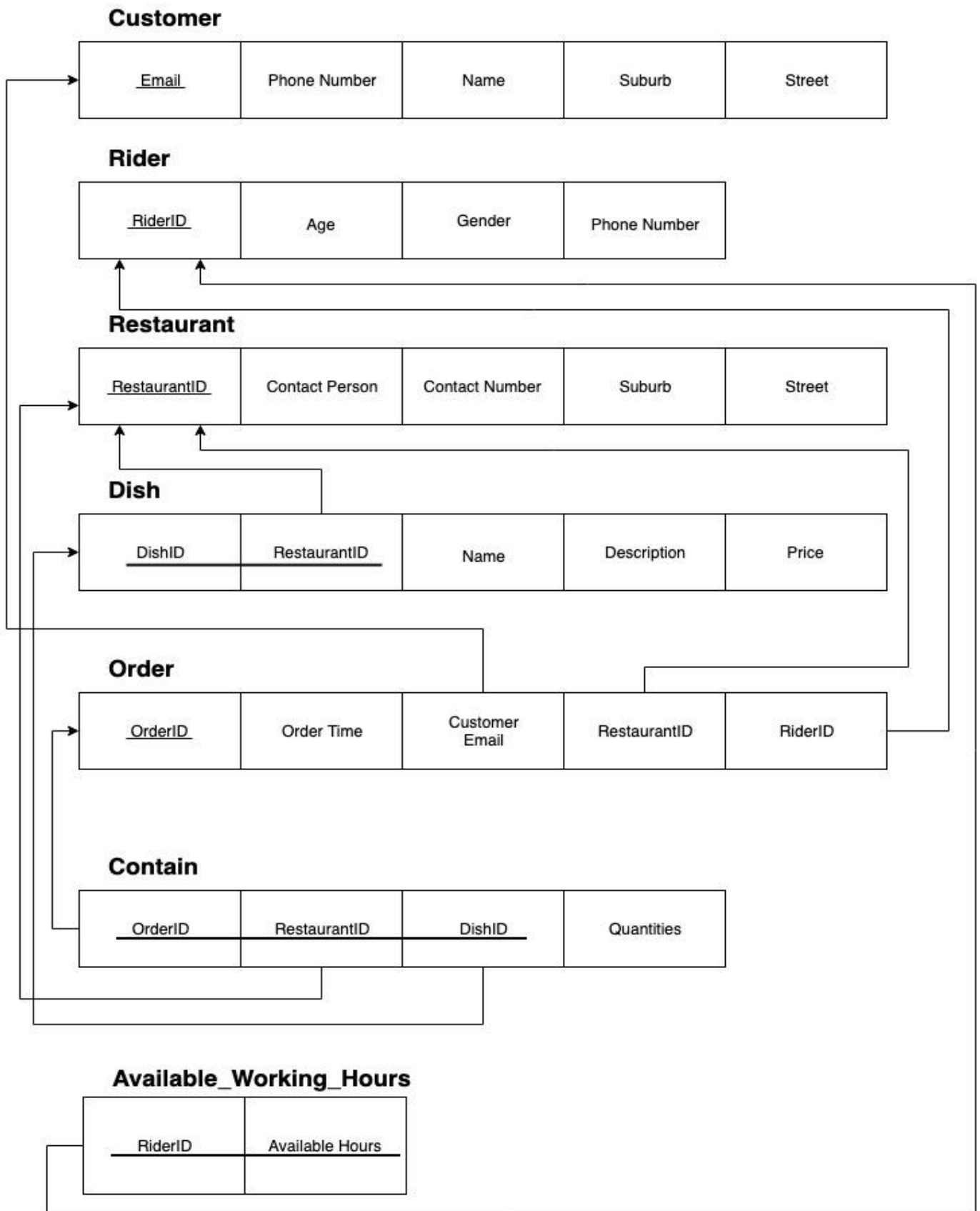


# ASSIGNMENT 1

## PROBLEM 1



## PROBLEM 2



### PROBLEM 3

1)

$A \leftarrow \sigma_{\text{name}='Taylor Swift'} (\text{Artist})$

$B \leftarrow \sigma_{\text{role}='composer'} (\text{SongCreating})$

$C \leftarrow \sigma_{\text{genre}='pop'} (\text{GenreOfSong})$

$D \leftarrow \text{Song}$

$\Rightarrow \pi_{\{\text{title}\}}(D \bowtie C \bowtie B \bowtie A)$

2)

$A \leftarrow \sigma_{\text{name}='Taylor Swift' \text{ or } \text{name}='Ed Sheeran'} (\text{Artist})$

$B \leftarrow \sigma_{\text{role}='composer'} (\text{SongCreating})$

$C \leftarrow \text{Song}$

$\Rightarrow \pi_{\{\text{title}\}}(C \bowtie B \bowtie A)$

3)

$A \leftarrow \sigma_{\text{Name}='Universal Music Group'} (\text{Company})$

$B \leftarrow \text{JoinIn}$

$C \leftarrow \sigma_{\text{gender}='female'} (\text{Artist})$

$D \leftarrow \text{SongCreating}$

$E \leftarrow \sigma_{\text{genre}='hip-hop'} (\text{GenreOfSong})$

$F \leftarrow \sigma_{\text{genre}='pop'} (\text{GenreOfSong})$

$X \leftarrow \pi_{\{\text{Artist.name}\}} (F \bowtie D \bowtie C \bowtie B \bowtie A)$

$Y \leftarrow \pi_{\{\text{Artist.name}\}} (E \bowtie D \bowtie C \bowtie B \bowtie A)$

$\Rightarrow X - Y$

4)

$A \leftarrow \text{Artist}$

$B \leftarrow \text{SongCreating}$

$C \leftarrow \text{GenreOfSong}$

$E \leftarrow \sigma_{\text{name}='Taylor Swift'} (\text{Artist})$

$X \leftarrow \pi_{\{\text{name}, \text{sID}\}}(C \bowtie B \bowtie A) \div \pi_{\{\text{sID}\}}(C)$

$Y \leftarrow \pi_{\{\text{name}\}}(B \bowtie A \bowtie (\pi_{\{\text{sID}\}}(B \bowtie A))) - \pi_{\{\text{name}\}}(E)$

$\Rightarrow X \cap Y$