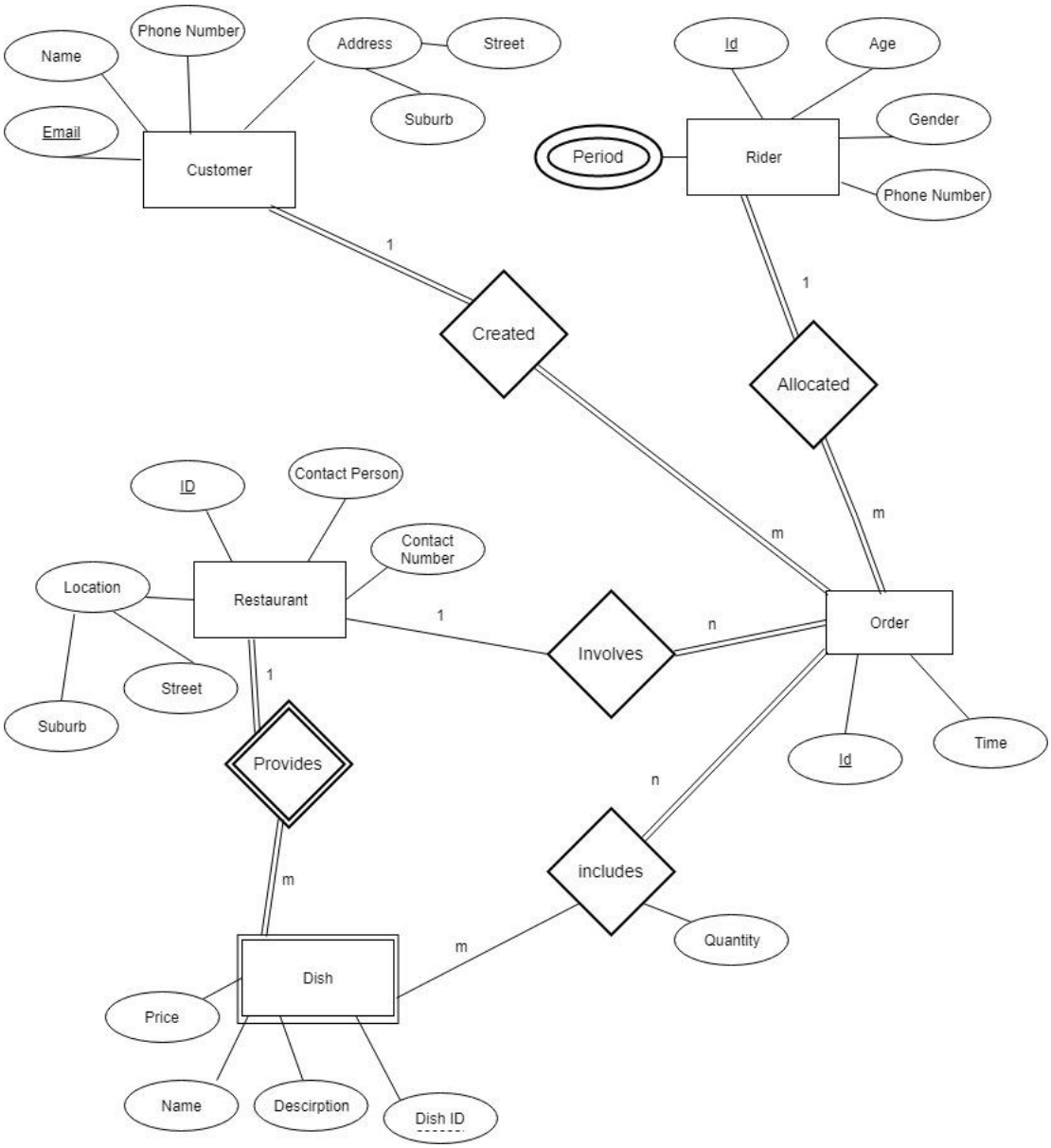
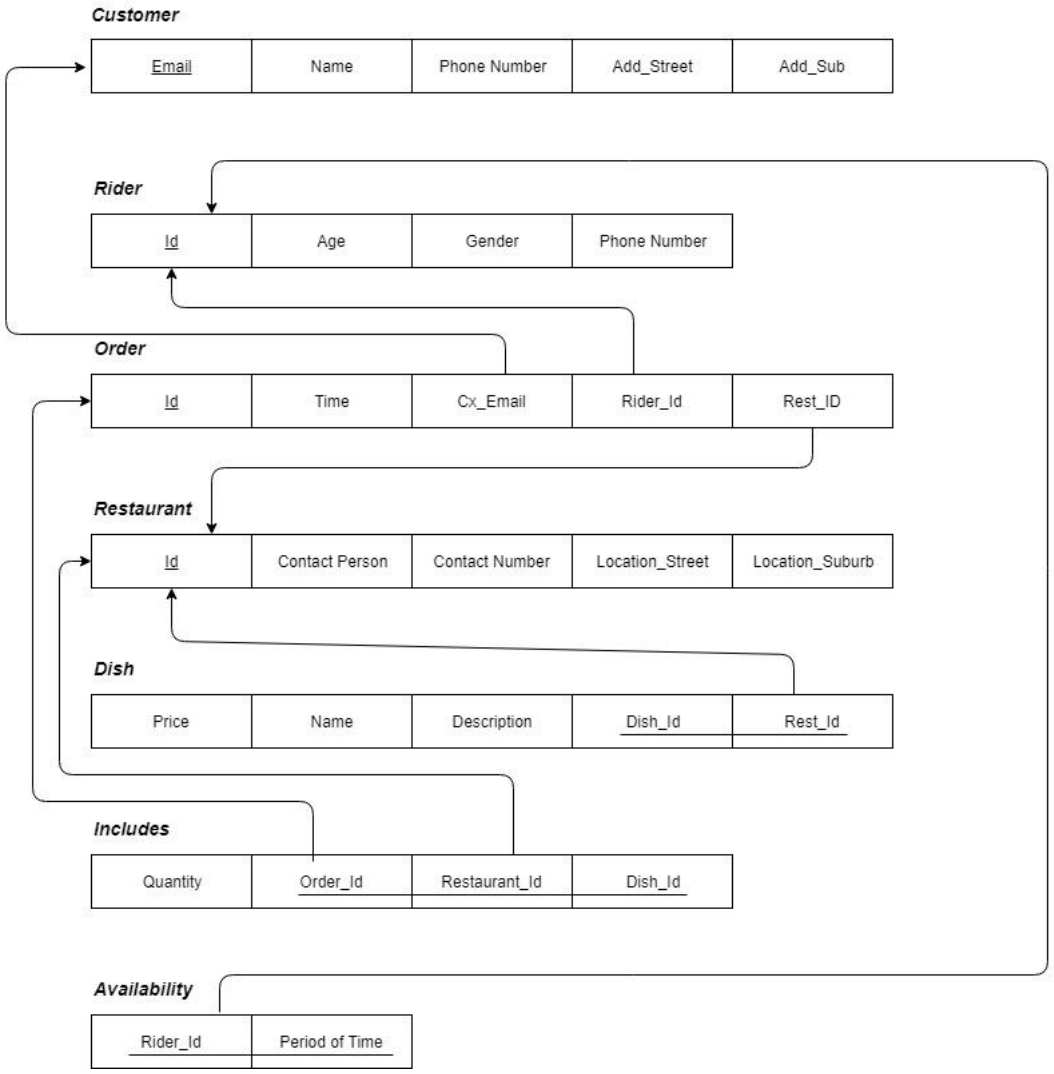
Question 1) ER diagram



Question 2 : Relational Diagram



Question 3 Relational Algebra

Ans 1)

$R1 \leftarrow (\text{Song} \bowtie_{(sid,sid)} (\sigma_{(genre = \text{'pop'})} (\text{GenreOfSong})))$

$R2 \leftarrow (\sigma_{(name = \text{'Taylor Swift'})} (\text{Artist})) \bowtie_{(aid=aid)} (\sigma_{(role = \text{'composer'})} (\text{SongCreating}))$

$\pi_{(title)} \{ R1 \bowtie_{(sid=sid)} R2 \}$

Ans 2)

$\pi_{\{title\}}((\sigma_{(name = \text{'Taylor Swift' or 'Ed Sheeran'})} (\text{Artist})) \bowtie (\sigma_{(role = \text{'composer'})} (\text{SongCreating})) \bowtie \text{Song})$

Ans 3)

$R1 \leftarrow ((\sigma_{(gen = \text{'female'})}) (\text{Artist})) \bowtie \text{JoinIn} \bowtie (\sigma_{(name= \text{'Universal Music Group'})} (\text{Company}))$

$R2 \leftarrow (R1 \bowtie \text{SongCreating} \bowtie (\sigma_{(genre= \text{'pop'})} (\text{GenreOfSong})))$

$R3 \leftarrow (R1 \bowtie \text{SongCreating} \bowtie (\sigma_{(genre= \text{'hip hop'})} (\text{GenreOfSong})))$

$\pi_{\{name\}}(R2 - R3)$

Ans 4)

$R1 \leftarrow \pi_{\{name\}}((\text{Artist} \bowtie \text{SongCreating} \bowtie \text{GenreOfSong}) \div \pi_{\{genre\}} (\text{GenreOfSong}))$

$R2 \leftarrow \pi_{\{sid\}}((\sigma_{(name = \text{'Taylor Swift'})} (\text{Artist})) \bowtie \text{SongCreating})$

$R3 \leftarrow (R2 \bowtie \text{SongCreating} \bowtie \text{Artist})$

$R4 \leftarrow (\sigma_{(name = \text{'Taylor Swift'})} R3)$

$R5 \leftarrow \pi_{\{name\}}(R3 - R4)$

$\pi_{\{name\}} (R1 \cap R5)$