Use the attached diagram to write relational algebra expressions to answer the following:

1. Find the first and last names of all customers with a room in our system named "Kitchen"

   RESULT $\longleftarrow \pi_{\text{first, last}}$ (CUSTOMER * ($\sigma_{\text{name = "Kitchen"}}$(ROOM)))

2. Find the first and last names of all customers who have used a paint color named "Shocking Red"

   PAINTED_RED $\longleftarrow$ PAINTED * ($\sigma_{\text{name = "Shocking Red"}}$(PAINT_COLOR))

   RESULT $\longleftarrow \pi_{\text{first, last}}$ (CUSTOMER * PAINTED_RED)

3. Find the business name of all contractors who do not have a phone number in our database.

   HAS_PHONE $\longleftarrow \pi_{\text{bus\_name}}$ (CONTRACTOR_PHONE)

   ALL_CONTRACTORS $\longleftarrow \pi_{\text{bus\_name}}$ (CONTRACTOR)

   RESULT $\longleftarrow$ ALL_CONTRACTORS - HAS_PHONE

4. Find the business name of all contractors who have neither a phone number in our system nor have been hired by a customer.

   HAS_PHONE $\longleftarrow \pi_{\text{bus\_name}}$ (CONTRACTOR_PHONE)

   HAS_BEEN_HIRED $\longleftarrow \pi_{\text{bus\_name}}$ (HIRE)

   ALL_CONTRACTORS $\longleftarrow \pi_{\text{bus\_name}}$ (CONTRACTOR)

   RESULT $\longleftarrow$ ALL_CONTRACTORS – (HAS_PHONE $\cup$ HAS_BEEN_HIRED)

5. Find the business name of all contractors who have both a phone number in our system and have been hired by a customer.

   HAS_PHONE ⟵ $\pi_{\text{bus\_name}}$ (CONTRACTOR_PHONE)

   HAS_BEEN_HIRED ⟵ $\pi_{\text{bus\_name}}$ (HIRE)

   RESULT ⟵ HAS_PHONE ∩ HAS_BEEN_HIRED

   Another way to do this one is

   RESULT ⟵ $\pi_{\text{bus\_name}}$ (CONTRACTOR_PHONE * HIRE)