Elliot Smith
Exercise 1 - RA & RC

Part I - Relational Algebra

1. Which beans are in the coffee named "Blend 101"?

   PROJECT (BEAN_NAME) (SELECT (COFFEE = "Blend 101") (HAS_BEAN))

2. Which people drink a coffee that contains the "Pacas" coffee bean?

   PROJECT (PERSON) (SELECT (BEAN_NAME = "Pacas") (DRINKS * HAS_BEAN))

3. Who does not drink a coffee containing a bean from the location "Rwanda"?

   PROJECT (PERSON) (DRINKS) - PROJECT (PERSON) (SELECT (FROM_LOCATION = "Rwanda") (DRINKS * HAS_BEAN * BEAN))

Part II - Relational Calculus

1. Which locations contribute a bean to the coffee named "Garuda blend"?

   {b.FROM_LOCATION | BEAN(b) and EXISTS(h)(HAS_BEAN(h) and b.BEAN_NAME = h.BEAN_NAME and h.COFFEE = "Garuda blend")}

2. Who has never tried a coffee containing a bean from the location "Hawaii"?

   {d1.PERSON | DRINKS(d1) and NOT EXISTS(d2, h, b)(DRINKS(d2) and HAS_BEAN(h) and BEAN(b) and b.FROM_LOCATION = "Hawaii" and d2.COFFEE = h.COFFEE and h.BEAN_NAME = b.BEAN_NAME and d1.PERSON = d2.PERSON)}

3. Which people drink all of the coffees containing the bean "Caturra"?

   {d1.PERSON | DRINKS(d1) and FORALL(h)(HAS_BEAN(h) and h.BEAN_NAME = "Caturra" => EXISTS(d2)(DRINKS(d2) and d2.COFFEE = h.COFFEE and d2.PERSON = d1.PERSON))}