Predicate Logic – Exercises for Week 8

Domain: {Beckett, Ionesco, Pinter, Stoppard}

Names:		
	b	Beckett
	i	Ionesco
	p	Pinter
	s	Stoppard

Predicates:		
	Bxy	x was born before y
	Dxy	x was born in the same decade as y
	Ixy	x is the same person as y
	Pxy	x and y come from different planets

1. Taking the above interpretation:

   i. List all the ordered pairs on the domain.

   ii. How many ordered 3-tuples are there on the domain? How many ordered 4-tuples?

   iii. How many ordered pairs are there in the relation Bxy on the domain?

   iv. Explaining your reasoning, classify each of the above relations on the domain as:
   (a) reflexive, irreflexive, or non-reflexive;
   (b) symmetric, asymmetric, or non-symmetric;
   (c) transitive, intransitive, or non-transitive;
   (d) connected or non-connected.

   v. What is an equivalence relation?

   vi. Which of the above are equivalence relations on the domain? Give the partition of the domain for each such relation.

2. Show by means of predicate tableaux that:

   i. Any asymmetric relation is irreflexive.

   ii. Any intransitive relation is irreflexive.

   iii. No non-symmetric transitive relation is irreflexive.

   iv. If a relation is both symmetric and asymmetric, it must be the null relation ($R = \emptyset$).

   v. If a relation is both reflexive and irreflexive, it must be on the null domain ($D = \emptyset$).

3. Do exercises 31.1 and 31.2 from the Logic Exercises booklet.

4. If you have time and would like more practice on relations,[1] have a go at exercise 31.5.

[1] "One should try everything once, except incest and folk-dancing." – Guy Warrack (1900-86), Scottish composer.