**CS4123 Autumn 2016**

**Homework Assignment 8 Island Hopping**

The ER diagram below represents a new type of advance-purchase ticket designed for island-hopping. This works a bit like an ‘around the world ticket’ but in a more limited geographical area. Each customer pays in advance (Price) for a Ticket which allows them to visit many islands within a given time period, arriving and leaving by specific ports on specific dates. Each ‘hop’ of the journey allows the ticket-holder to Depart from one particular Port on specified Ddate and Arrive at another specific Port. Each port in the scheme is identified by its PID and also has a name (Pname) and other attributes including its Phone number and the number of Parking spaces it has. Each island in the scheme is identified by its Iname and has a population (Pop) and an Area (in square metres). Other attributes are shown in the diagram and typical values of attributes can be found in the questions from Q4 onwards.

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**Q1**

1. Using the basic sets, **IDS, Numbers, Names, Dates** and **Money,** declare at least 8 specific **Domains** to model the data.
2. Using your domains and the basic sets where required, write the Z record structure schemas for the Relations implied by the E-R diagram and the description above.

**Q2**

Write the State schema in Z for the **IslandFerries** database. Include all the existential and referential database integrity constraints.

**Q3**

Write an operation schema to insert into the database a tuple represented by the variable **t?** for the creation of a new Ticket. The TID must be unique.

**Q4**

Write an operation schema to insert into the database a tuple represented by the variable **h?** that allows a new Hop to be added to a customer’s Ticket. Check that a valid ticket number is specified, that the identifier is unique and that both ports specified are valid.

**Q5**

Write an operation schema to modify an island’s designated port. The old port identified by the domain variable **o?** is to be removed from the database and replaced by a new port represented by the tuple variable **n?** The island must already be in the database. There must be no ticket in the system with a Hop involving that port.