

# COM 6854: Verification and Testing

## Exercise Sheet 7

**Exercise 1:** Write a Z specification for a simple stock control system of a shop. The shop sells various *items*. Every item has a *cost* (which gives its price), a *stock* (the number of this item that is present) and an *order* (the number of this item that has been ordered) associated to it.

- (a) Write a state schema *Shop* that maintains the cost, stock and order information of the shop. It is required that the cost of each item ordered is known.
- (b) Initialise the shop in a convenient way.
- (c) Write an operation schema *PriceChange* that updates the system with respect to price changes and notifies the user about this.
- (d) Write an operation schema *SellItem* that updates the system with respect to items sold and notifies the user about this. Write also exception schemas *NoItem* and *NoPrice* when a sales action fails since the item is not in stock or has no valid price.
- (e) Write the operation schemas *OrderNewItem* and *OrderItem* for ordering items whenever their number is below a certain *order level*. Notify the user about the fact that items have been ordered.

If you find it hard to write the predicates in the Z language, then use natural language. We will also discuss a (rather complex) operation schema *Delivery* that handles the items ordered when they arrive, rejecting excess items and items not ordered. You may try to specify this operation, too.