5. **COL703: Major-Q4 11:00-11:25, late submissions accepted till 11:30, 3+3+6+3 = 15 marks**

    You may use Horn clauses or Prolog syntax and Prolog functions for this problem.

    (a) Express the datatype of stack of integers as a set of Horn-clauses (along with whatever typing axioms are necessary for this purpose)

    (b) Use Horn clauses to define a predicate `nf` which determines when a stack expression is in normal form.

    (c) Use Horn clauses to define an equality predicate `eq` which defines when two stacks of integers are equal.

    (d) Define a predicate `val` which defines the values in a stack as a list of integers, with the top of stack being the head of the list.