Algebraic Specifications of Stack

LIFO stack (independent of item type on stack)

NEW creates a new stack
PUSH adds a new item to the top of the stack
EMPTY returns true if the stack is empty and false otherwise
TOP returns a copy of the top item
POP removes the top item

Syntax:

<table>
<thead>
<tr>
<th>operation</th>
<th>domain</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW</td>
<td>( ) --&gt;</td>
<td>STACK</td>
</tr>
<tr>
<td>PUSH</td>
<td>(STACK, ITEM) --&gt;</td>
<td>STACK</td>
</tr>
<tr>
<td>EMPTY</td>
<td>(STACK) --&gt;</td>
<td>BOOLEAN</td>
</tr>
<tr>
<td>TOP</td>
<td>(STACK) --&gt;</td>
<td>ITEM</td>
</tr>
<tr>
<td>POP</td>
<td>(STACK) --&gt;</td>
<td>STACK</td>
</tr>
</tbody>
</table>

The Axioms:
(stk is of type STACK and itm is of type ITEM)

1) EMPTY(NEW) = true
2) EMPTY(PUSH(stk, itm)) = false
3) TOP(NEW) = error
4) TOP(PUSH(stk, itm)) = itm
5) POP(NEW) = error
6) POP(PUSH(stk, itm)) = stk

Identify the essential builders (NEW, PUSH).
Compose each of the other functions with each essential builder.
Describe the actions in terms of the other functions.