Discussion 6: Concurrency

Mutability Review

1. What does it mean for data to be mutable?
   Data that is mutable can be changed outside of its own scope.

2. What kind of data in Snap! is mutable?
   Lists

Concurrency

1. For the following two subparts, suppose we have the three scripts, four broadcast blocks, and four predicates below:

   Scripts | Car: | Pedestrian: | Traffic Light:
   ---|---|---|---
   | ![Car Script](image1) | ![Pedestrian Script](image2) | ![Traffic Light Script](image3)

   Broadcast Blocks
   - **broadcast**: done driving
   - **broadcast**: done walking
   - **broadcast**: drive
   - **broadcast**: walk

   Predicates
   - **traffic light says drive?**
   - **traffic light says walk?**
   - **person says drive?**
   - **car says walk?**

   a. Fill in the code for the car and the pedestrian such that there will be a deadlock.

   | car | pedestrian |
   ---|---|---|
   waits until… | ![person says drive?](image4) | ![car says walk?](image5) |
   broadcasts… | ![broadcast walk](image6) | ![broadcast drive](image7) |

   b. Fill in the code for the car and the pedestrian such that there will not be a deadlock (i.e. the car and the person move without conflicting with each other).

   | car | pedestrian |
   ---|---|---|
   waits until… | ![traffic light says drive?](image8) | ![traffic light says walk?](image9) |
   broadcasts… | ![broadcast done driving](image10) | ![broadcast done walking](image11) |

2. Which of the following could be the value of `my_name` after the green flag is clicked?
To solve this question, we want to find account for all possible orderings of the above blocks. To do this, we can make a table where we account for different orders:

<table>
<thead>
<tr>
<th></th>
<th>set my name to Dan</th>
<th>set my name to Garcia</th>
<th>set my name to join my name Oski</th>
<th>4</th>
<th>GarciaOskiBear</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td>GarciaBear</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td></td>
<td>GarciaBearOski</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td></td>
<td>DanOski</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
<td>DanOskiBear</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td></td>
<td>DanBearOski</td>
</tr>
</tbody>
</table>

Note: can never come before , as can never come before .

**Challenge**

1. List all possible values of grade after the green flag is clicked.

Here are the definitions of the blocks used in the above scripts:

Using a similar strategy as above, the possible values are: 225, 150, 105, and 195.