1. **Is there a difference between the symmetric closure of the transitive closure of a relation *R* and the transitive closure of the symmetric closure of *R*?**

**Deliverable: If your answer is that these are the same, you should give an argument, if you think these are different you should give an example that illustrates the difference.**

***Answer:***

*These are not the same, and there is a difference*

*We can easily use our test generator from the previous exercise Lab4\_7. It will call the relation generator and test 100 times. We can capture lots of failing example.*

*Let’s take the smallest example I found:*

*We have a set A = {1,2}*

*And a relation R =* [(1,2)]

Applying the argument check on R (consult lab4\_8.hs), returns false.

Another example is

*We have a set A = {0,1}*

*And a relation R =* [(0,0), (1,0)]

Applying the argument check on R (consult lab4\_8.hs), returns false.

**\*Lab4\_8>** isTrueArg [(1,2)]

**False**

**\*Lab4\_8>** isTrueArg [(0,0),(1,0)]

**False**

Consult lab4\_8.hs to find more failing examples.

More closely on the two sides of the statement we just proved it is false:

**\*Lab4\_8>** symClos $ trClos [(1,2)]

[(1,2),(2,1)]

**\*Lab4\_8>** trClos $ symClos [(1,2)]

[(1,1),(1,2),(2,1),(2,2)]

**\*Lab4\_8>** trClos [(1,2)]

[(1,2)]

Because there is no relation from 2 to 1 or any other element (in this case, we have only two elems).

Whereas,

**\*Lab4\_8>** symClos [(1,2)]

[(1,2),(2,1)]

Now we have a relation from 2 to 1, and that makes (1,1) & (2,2) part of the transitive closure of the symmetric closure of R.

However, we noticed that the following might be a true statement:

**trClos $** symClos $ trClos of R = trClos $ symClos of R

consult lab4\_8.hs to run the test generator to test the correctness of the new statement.