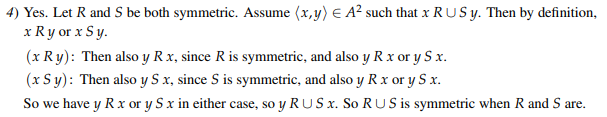
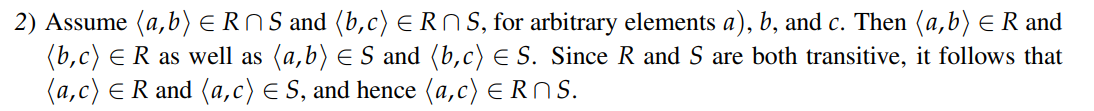
,-artycxGl my bois

1q` aZx ç 0, 1

* 2. + - R is reflexive
       - R is symmetric
       - R is transitive
     1. is symmetric but not reflexive.
        + Take R and S, two arbitrary symmetric relations.
        + Assume that their union contains <a, b> with a and b arbitrary.
        + (def. of )
        + (R and S are symmetric)
        + (def. of )
        + We’ve shown . Therefore, is symmetric.



* + 1. - Take R and S, two arbitrary transitive relations.
       - Assume that their intersection contains <a, b> and <b, c> with a, b and c arbitrary.
       - (def. of )
       - Since is commutative, we get
       - By transitivity of R and S we have
       - (def. of )
       - Therefore, is transitive.

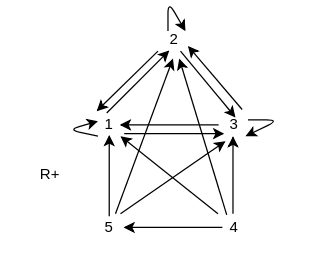
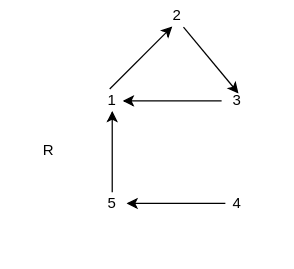


* + 1. - is transitive. - this isnt transitive is it?? Its missing <2, 2>. You are right, <2, 2> is missing.
       - is transitive.
       - which is not transitive since it contains <1, 2> and <2, 3> but not <1, 3>.

Another example:

* + - * R = {<1, 2>} is transitive
      * S = {<2, 1>} is transitive
      * RUS = {<1, 2>, <2, 1>} is not transitive because it is missing <1, 1> and <2, 2>
  1. i.

ii.

* 1. Assume a symmetric set R. 

Then, if we have

We also have

*(by commutativity of )*

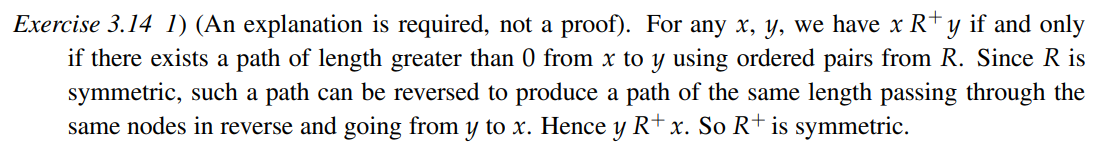
Therefore R² is symmetric.

Therefore, for any symmetric is symmetric.

Therefore, for any symmetric is symmetric.

So if R is symmetric, is symmetric for any natural n, including

*Dodgy af but the idea is kind of induction over the transitivity of* . *I’m sure there’s a better way to write it down.*



Alt d. Take arb a, b∈A s.t. a R+ b

By def of R+, a(R R^2 R^3 ...)b

aRb | aR^2b | aR^3b |..

To prove, for all n ∈ Nat+, R^n is symmetric

Base case : When n = 1, R is symmetric (by def)

Inductive case: Assume R^n is symmetric, let S = R^n

Take arb a, b∈A s.t. a(S o R)b

Therefore Ǝc∈A[aSc ^ cRb]

As S and R are both symmetric, Ǝc∈A[cSa ^ bRc]

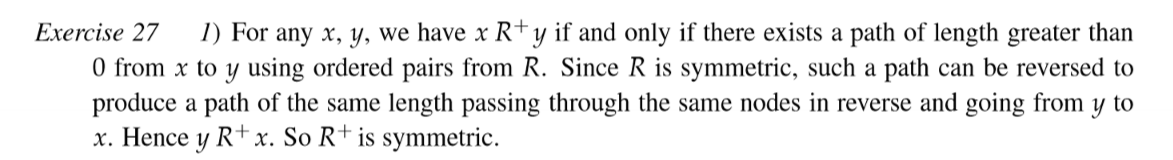
Therefore b(S o R)a, which means (S o R) is symmetric, hence R^(n+1) is symmetric.

By Induction, for all n ∈ Nat+, R^n is symmetric.

Therefore bRa | bR^2a |bR^3a |..

By def of R+, b R+ a

Hence R+ is symmetric.



* 1. i. In order for a relation R to be an equivalence relation, it should be symmetric, reflexive and transitive.

ii. (reflexive + circular => equivalence)

* R is circular =
* Take (R is reflexive)

To show: R is symmetric and transitive.

I. Symmetry:

bRb bRa) (R is symmetric)

II. Transitivity:

(because circular)

By symmetry,

So, R is transitive.

R is reflexive, symmetric and transitive, thus it is an equivalence relation on A.

(equivalence => reflexive + circular)

* R is reflexive:

True, equivalence implies reflexivity.

* R is circular:

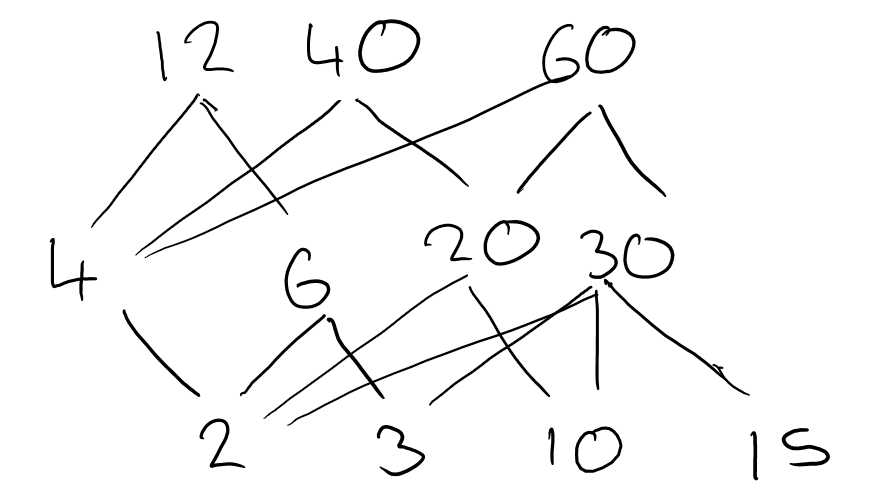
(transitivity)

(symmetry)

(tran. + sym.)

So, R is circular

* + 1. R is a pre-order if it is reflexive and transitive.
    2. R is anti-symmetric =
    3. R is a partial order if it is reflexive, transitive and anti-symmetric.
    4. R is irreflexive =
    5. R is a strict partial order if it is irreflexive and transitive.
    6. R is a total order is a partial order that also satisfies



* + 1. **Since not reflexive (1 is not in F so K cannot be 1)9**

**A false, B True, C False, D True, E True, F False**

* 1. z
     1. The relation “~” between sets A and B (A ~ B) means that there exists a bijection f: B -> A.Le
     2. 