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**Alloy Homework 3**

***Alloy Lab 3***

1. a. Friend$2, Friend$4  
   b. Friend$1, Friend$3, Friend$4  
   c. Friend$5.friendsWith  
    friendsWith.Friend$5  
   d. Friend$5 in Friend$2.^friendsWith and Friend$2 in Friend$5.^friendsWith  
    evaluates to true  
   e. some f: Friend | univ = f.^friendsWith  
    evaluates to true  
   f. all f: Friend | univ = f.^friendsWith  
    evaluates to true  
   g. set {f: Friend | f.^friendsWith = univ}  
    evaluates to {Friend$1, Friend$2, Friend$3, Friend$4, Friend$5}  
   h. Because you ran the model for degreeOfSeperation, which takes a friend parameter. So in this model, the parameter for degreeOfSeparation is Friend$5.
2. a. {IntTest$0->0}  
   b. The value is 0 when it should be 52  
   c. Yes it did. It fixed it because the max value of an integer by default is only 3 bits, so the maximum range was -2 to 2. With the increased bit length, the max value can comfortably fit -2 to 10.  
   d. x = 3, y = 2  
    Alloy is not very good for solving integer programming problems because it is not intelligent in its method of finding a solution. It will simply attempt to brute force the answer. With many variables this may never finish. There are numerous better integer problem solvers.