Part A. Show that these arguments are invalid. In each case give an appropriate domain and state description. Use the indicated symbolic letters, as well as additional name letters as needed. Your answers should look similar to the answer for #1. *

1. Nothings is a red pig. So, somethings are not red. (R, P)
   \[
   D = \{ a, b \} \quad Ra, Pa, Rb, Pb \quad \begin{array}{ccc}
   Ra & Pa & Rb \\
   T & F & T \\
   Pb & F & F
   \end{array}
   \]
   For this domain and description:
   Are the premisses \( T \)? \( \text{yes} \)
   Is the conclusion \( F \)? \( \text{yes} \)

2. George is smart. So, George is a smart person. (g, S, P)
   \[
   D = \{ \} \quad \text{__________}
   \]
   Are the premisses \( T \)? \( \text{____} \)
   Is the conclusion \( F \)? \( \text{____} \)

3. George is funny. So, some people are funny. (g, F, P)
   \[
   D = \{ \} \quad \text{__________}
   \]
   Are the premisses \( T \)? \( \text{____} \)
   Is the conclusion \( F \)? \( \text{____} \)

4. There are no funny people. So, George is not funny. (F, P, g)
   \[
   D = \{ \} \quad \text{__________}
   \]
   Are the premisses \( T \)? \( \text{____} \)
   Is the conclusion \( F \)? \( \text{____} \)

5. Some cats sing. Some cats dance. So, some cats sing and dance. (C, S, D)
   \[
   D = \{ \} \quad \text{__________}
   \]
   Are the premisses \( T \)? \( \text{____} \)
   Is the conclusion \( F \)? \( \text{____} \)

6. Some people are not singers. So, some singers are not people. (P, S)
   \[
   D = \{ \} \quad \text{__________}
   \]
   Are the premisses \( T \)? \( \text{____} \)
   Is the conclusion \( F \)? \( \text{____} \)

7. All cats have tails. So, all non-cats do not have tails. (C, T)
   \[
   D = \{ \} \quad \text{__________}
   \]
   Are the premisses \( T \)? \( \text{____} \)
   Is the conclusion \( F \)? \( \text{____} \)

8. All cats have tails. George has a tail. So, George is a cat. (C, T, g)
   \[
   D = \{ \} \quad \text{__________}
   \]
   Are the premisses \( T \)? \( \text{____} \)
   Is the conclusion \( F \)? \( \text{____} \)

9. All cats are smart. Some smarties are funny. So, some cats are funny. (C, S, F)
   \[
   D = \{ \} \quad \text{__________}
   \]
   Are the premisses \( T \)? \( \text{____} \)
   Is the conclusion \( F \)? \( \text{____} \)

10. All things are smart. All funny cats are smart. So, all cats are funny. (S, F, C)
    \[
    D = \{ \} \quad \text{__________}
    \]
    Are the premisses \( T \)? \( \text{____} \)
    Is the conclusion \( F \)? \( \text{____} \)

* Throughout, many different answers are possible.  

>> Continued on back side >>
Part B. Show that the following arguments are invalid. In each case give an appropriate domain and state description. Your answers should look similar to the answer for #1.

(Don't use the domain individuals "a" and "b" here. Use the individuals "d" and "e" instead. Otherwise, things may get too confusing.)

11. $(\exists x)Ax \land (\exists x)Bx \therefore (\exists x)(Ax \land Bx)$
   
   \[ D = \{ \_ \_ \_ \} \]  
   
   Are the premisses = T ? ____  
   
   Is the conclusion = F ? ____

12. $(\forall x)(Ax \lor Bx) \therefore (\forall x)Ax \lor (\forall x)Bx$
   
   \[ D = \{ \_ \_ \_ \} \]  
   
   Are the premisses = T ? ____  
   
   Is the conclusion = F ? ____

13. $(\exists x)\neg(Ax \land Bx) \therefore (\exists x)\neg Ax \land (\exists x)\neg Bx$
   
   \[ D = \{ \_ \_ \_ \} \]  
   
   Are the premisses = T ? ____  
   
   Is the conclusion = F ? ____

14. $(\forall x)Ax \supset (\exists x)Bx \therefore (\exists x)Ax \supset (\forall x)Bx$
   
   \[ D = \{ \_ \_ \_ \} \]  
   
   Are the premisses = T ? ____  
   
   Is the conclusion = F ? ____

15. $(\forall x)Ax \supset (\forall x)Bx \therefore (\exists x)Ax \supset (\exists x)Bx$
   
   \[ D = \{ \_ \_ \_ \} \]  
   
   Are the premisses = T ? ____  
   
   Is the conclusion = F ? ____

16. $(\forall x)(Ax \supset Bx) \therefore (\forall x)((Ax \lor Cx) \supset Bx)$
   
   \[ D = \{ \_ \_ \_ \} \]  
   
   Are the premisses = T ? ____  
   
   Is the conclusion = F ? ____

17. $(\forall x)(Ax \lor Bx), (\forall x)(Bx \lor Cx) \therefore (\forall x)(Ax \lor Cx)$
   
   \[ D = \{ \_ \_ \_ \} \]  
   
   Are the premisses = T ? ____  
   
   Is the conclusion = F ? ____

18. $(\forall x)(Ax \lor Cx), (\exists x)(Ax \land Bx) \therefore (\exists x)(Ax \land Cx)$
   
   \[ D = \{ \_ \_ \_ \} \]  
   
   Are the premisses = T ? ____  
   
   Is the conclusion = F ? ____