

**Sample Solutions to Homework Handout 3: Relational Predicates: Translating to English**

Use the following translation key to translate the given formulas into natural English sentences:

Ax: x is silver  
Bxy: x belongs to y  
Cx: x is a cloud  
Cxy: x keeps company with y  
Dx: x is a dog  
Ex: x is smoke  
Fx: x is fire  
Fxy: x is fair for y  
g: God  
Gx: x is glass  
Gxy: x gathers y  
Hx: x is home  
Hxy: x helps y  
Ixy: x is in y  
Jxy: x is judged by y  
Kxy: x is a jack of y  
Lx: x is a lining  
Lxy: x is like y  
Mx: x is moss  
Mxy: x is master of y  
Px: x is a person  
Qx: x is a place  
Rx: x rolls  
Sx: x is a stone  
Tx: x is a trade  
Txy: x should throw y  
Ux: x is a house  
Uxy: x comes to y  
Vxy: x ventures y  
Wx: x waits  
Yx: x is a day

1.  $(x)[Dx \supset (\exists y)(Yy \cdot Byx)]$   
Every dog has its day.
2.  $(x)[(\exists y)(Py \cdot Fxy) \supset (z)(Pz \supset Fxz)]$   
What's fair for one is fair for all.
3.  $(x)[(Rx \cdot Sx) \supset (y)(My \supset \sim Gxy)]$   
Rolling stones gather no moss.
4.  $(x)[(Px \cdot Wx) \supset (y)Uyx]$   
Everything comes to those who wait.
5.  $(x)[(Px \cdot Hxx) \supset Hgx]$   
God helps those who help themselves.
6.  $(x)[Hx \supset (y)(Qy \supset \sim Lyx)]$   
There is no place like home.
7.  $(x)\{Cx \supset (\exists y)[(Ay \cdot Ly) \cdot Byx]\}$   
Every cloud has a silver lining.
8.  $(x)[Px \supset (y)(Cxy \supset Jxy)]$   
A person is judged by the company (s)he keeps.
9.  $(x)\{Qx \supset [(\exists y)(Ey \cdot Iyx) \supset (\exists z)(Fz \cdot Izx)]\}$   
Where there's smoke, there's fire.
10.  $(x)\{[Px \cdot (y)(Ty \supset Kxy)] \supset (z)(Tz \supset \sim Mxz)\}$   
A jack of all trades is a master of none.
11.  $(x)\{[Px \cdot (\exists y)[(Gy \cdot Uy) \cdot Ixy]] \supset (z)(Sz \supset \sim Txz)\}$   
People who live in glass houses shouldn't throw stones.
12.  $(x)\{[Px \cdot (y)\sim Vxy] \supset (z)\sim Gxz\}$   
Nothing ventured, nothing gained.