First-Order Logic Exercise Set # 1

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1.) $\forall x$ Student(x) $\rightarrow$ Human(x)
2.) $\exists x$ Book(x)$\wedge$ Useful(x)
3.) $\neg(\forall$ Book(x) $\rightarrow$Useful(x))
4.) $\forall x$ Dog(x) $\rightarrow \neg$Student(x)
5.) $\forall x \exists y$ Dog(x) $\wedge$ Day(y) $\rightarrow$ Has(x,y)
6.) $\exists x \forall y$ Human(x) $\vee$ Dog(y) $\rightarrow$ Likes(x,y)
7.) $\forall x \forall y \exists z$ Human(x) $\wedge$ Human(y) $\wedge$ Human(z) $\wedge$ Coworker(x, y) $\rightarrow$ Boss(x,z) $\wedge$ Boss(y,z)
8.) TonyStark$\rightarrow$IronMan
9.) $\exists x \forall y$ (Human(x)$\vee$ Dog(y))$\wedge$ Has(x,y)$\rightarrow$ Likes(x,y)
10.)
11.)$\exists$y(Dog(y) $\wedge\forall$x(Dog(x)$\rightarrow$ Likes(x,TonyStark))
12.)
13.) $\forall x$ Dog(x) $\rightarrow$ Useful(x)
14.)
15.) $\forall x \neg$Humans(x) $\rightarrow$ Students(x)
16.) $\forall x$ Book(x) $\wedge\neg$ Useful(x)
17.) $\forall x \exists y$ Student(x) $\wedge$ Book(x) $\rightarrow$ Has(x,y)
18.)
19.)$\exists x \forall y$ Human(x) $\wedge$ Books(y) $\rightarrow$ Has(x,y)
20.)