HW 3

#1 Formalization in FOL

1) $R(x)$: x is a red thing
$B(x)$: x is in the box

a) All red things are in the box.
$\forall x (R(x) \rightarrow B(x))$

b) Only red things are in the box
$\forall x (B(x) \rightarrow R(x))$

c) No animal is both a cat and a dog.
$A(x)$: x is an animal
$C(x)$: x is a cat
$D(x)$: x is a dog

$\forall x (A(x) \rightarrow \neg(C(x) \wedge D(x))$
$\forall x (A(x) \rightarrow (\neg C(x) \vee \neg D(x))$

d) Every prize was won by a boy.
$P(y)$: y is a prize
$B(x)$: x is a boy
$W(x,y)$: x won y (Adam won the lottery)

$\forall y (P(y) \rightarrow \exists x (B(x) \wedge W(x,y))$ For all prizes there exists some boy that won the prize)