Ethan Booker

Dr. Mao Zheng

CS 743 Software Verification and Validation

Homework 4

Propositional Logic

Problem:

If the death penalty is not cruel and unsual punishment, then either it is cruel and unusual punishment or if society is justified by using it, then it will deter other criminals. If the death penalty is cruel and unusual punishment, then it is both cruel and unusual punishment and its use degrades society as a whole. **It is not the case that both the death penalty is cruel and unusual punishment, and its use degrades society as a whole. Furthermore, the death penalty will not deter other criminals. Therefore, society is not justified in using the death penalty.**

Let

a - death penalty is cruel and unusual punishment

b - society justified by using it

c - deter other criminals

d - use degrades society as a whole

¬a ⇒ a ∨ ( b ⇒ c ) (1)

a ⇒ ( a ∧ d ) (2)

¬ (a ∧ d ) (3)

¬ c (4) From ¬b, premise -> conclusion

¬a (5) From 2, 3, modus tollens

a ∨ (b ⇒ c) (6) From 1, 5, modus ponens

b ⇒ c (7) From 5, 6, disjunctive syllogism

¬b (8) From 4, 7, modus tollens

The conclusion is logically correct as long as society is not justified in using the death penalty if death penalty will not deter other criminals.