

Logic and decision trees: Homework

Mathematics 170

due Tuesday, Feb. 11

1. Negate the sentence: “For every vote Senator Boxer gets, she has to spend \$10 and one hour of volunteer time.”
2. Let $P(x, y) = “x \text{ gives a contribution to } y,”$ $x = “\text{corporation},”$ and $y = “\text{politician}.”$
 - (a) Write the statement $\exists x \forall y P(x, y)$ in English.
 - (b) Write the statement $\forall y \exists x P(x, y)$ in English.
 - (c) Which statement implies the other one?
 - (d) Write the statement “Every corporation gives a contribution to some politician” symbolically.
 - (e) Write the statement “A politician got a contribution from a corporation” symbolically.
3. Consider the following axioms. If the IMF gives a country a loan, then it will impose structural adjustment. If a country has a structural adjustment program and provides welfare benefits, then the IMF did not give it a loan. If a country does not provide welfare benefits, then it experiences high poverty.

Prove that if a country does not experience high poverty, then the IMF did not give it a loan. Use either proof by contradiction or a direct proof.
4. Mathematics and Politics, pg. 17, problem 1.
5. Mathematics and Politics, pg. 18, problem 4.

6. Mathematics and Politics, pg. 19, problem 11.
7. Suppose you play the dollar auction against a very obnoxious person. You play so as to get the maximum amount of money out of it; he plays with the goal of making you lose as much money as possible (with no concern for how he does). If you get to start and you both play using the conservative convention, with stakes $s = 3$ and bankroll $b = 4$, what is your optimal strategy?