Philosophy 220A
Symbolic Logic I

Answers to Problem Set 8

Total: 74 marks

10.12 FO con, but not TT con. [5 marks]

truth-functional form ('Boolean goggles')

$P \rightarrow Q$
$\neg Q$

R

'First-order goggles'

$\forall x\ \text{Crob}(x) \rightarrow \exists y\ \text{Smil}(y)$
$\neg\exists y\ \text{Smil}(y)$

$\exists x \neg\text{Crob}(x)$

10.13 TT con [3 marks]

$P \rightarrow Q$
$\neg Q$

$\neg P$

10.17 Logical con, but not FO con (or TT con) [7 marks]

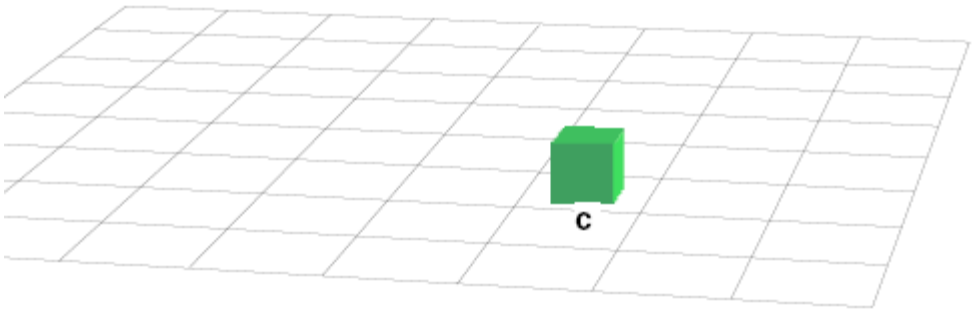
$\forall x(\text{Dudy}(x) \rightarrow \neg\text{SimCul}(x, c))$

$\neg\text{Dudy}(c)$

Suppose a Dudy is a cube, and SimCul(x, y) means that x is left of y. [Make sure that the relation is **not reflexive**.] Then the argument becomes:

T 1. ∀x (Cube(x) → ¬LeftOf(x, c))

F 2. ¬Cube(c)

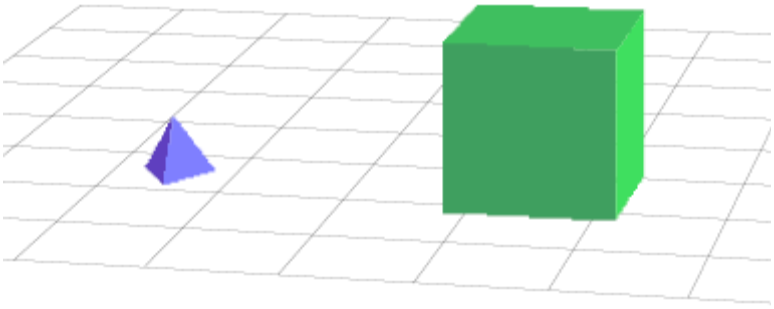


10.20 [5 marks]

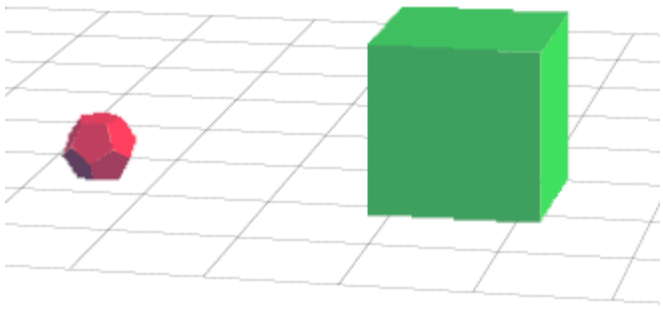
$\neg\exists x(P(x) \wedge Q(x)) \quad \Leftrightarrow \quad \forall x\neg(P(x) \wedge Q(x))$
$\forall x(\neg P(x) \vee \neg Q(x))$
$\forall x(P(x) \rightarrow \neg Q(x))$

10.25 [4 marks]

F 1. ¬∃z Small(z) ↔ ∃z ¬Small(z)



10.27 [4 marks]



F ∃w (Dodec(w) ∧ Large(w)) ↔ (∃w Dodec(w) ∧ ∃w Large(w))

10.29 logical truth [2 marks]

11.4 [16 marks]

T	1. ∀x ∀y ((Small(x) ∧ Large(y)) → FrontOf(x, y))
T	2. ∃x ∃y (Cube(x) ∧ Tet(y) ∧ Larger(x, y))
T	3. ∀x ∀y ((Cube(x) ∧ Cube(y)) → SameCol(x, y))
T	4. ¬∀x ∀y ((Tet(x) ∧ Tet(y)) → SameCol(x, y))
T	5. ∀x ∀y ((Cube(x) ∧ Cube(y) ∧ x≠y) → ¬SameRow(x, y))
T	6. ¬∀x ∀y ((Tet(x) ∧ Tet(y) ∧ x≠y) → ¬SameRow(x, y))
T	7. ∃x ∃y (Tet(x) ∧ Tet(y) ∧ x ≠ y ∧ SameSize(x, y))
T	8. ¬∃x ∃y (Cube(x) ∧ Cube(y) ∧ x ≠ y ∧ SameSize(x, y))

11.7

1. [16 marks]

2. Some of the parties are not lonely
3. There are at least two parties.
4. Some parties are lonely.
5. All parties are lonely

(there is no part 6)

7. There is only one party.
8. All parties are lonely.
9. No block is in all the parties. (or: There is more than one party)
10. There is more than one party.

11.12 [2 marks for each correct object, total 12 marks]