First Midterm
Philosophy 112
Winter 2001

Answer the following questions in the spaces below them.

1. (7 points each) Give the substitution instance using the constant 'a' for each of the following sentences of *PL*:

a. (∃x)(∃y)(Gxy & (∀z)(Gzxy ⊃ Byxa))

b. (∀y)(∃x)(∀z)(Xxz ⊃ (Gx ≡ Byav))

2. (9 points) Show all the subformulas of the following *PL* sentence:

(∀x)[Fxb ⊃ (∀z)((∃y)Gyx ∨ (∀w)(Fwb & ∼(∀y)(Gyx & Fza)))]

3. (7 points each) Symbolize the following sentences in *PL*, using the symbolization key provided.

UD: Everything
  d: Governor Davis   Fxy: x thinks y is a federal problem   Rx x is right
  b: President Bush   Sxy x thinks y is a state problem   Px: x is a person
  e: the energy crisis

a. President Bush thinks the energy crisis is a state problem, while Governor Davis thinks it is a federal problem, and one of them is wrong.

b. Whoever thinks the energy crisis is a state problem does not think it is a federal problem.

c. If someone who thinks the energy crisis is a state problem is right, then everyone who thinks it is a federal problem is wrong.

4. (7 points each) Symbolize the following sentences in *PLI*, using the symbolization key provided.

UD:Positive integers (1, 2, 3, . . .)

f: four   Gxy: x is greater than y
s: six   Lxy: x is less than y

a. Four, but not six, is less than or equal to four.

b. There is no positive integer which is greater than every positive integer.

c. Exactly one positive integer is less than six and greater than four.

5. (7 points each) Symbolize the following sentences in *PLI*, providing your own symbolization key.

Symbolization key

a. A small bus uses more energy than a large car.

b. Only trucks and buses are larger than SUVs.

c. Every SUV is larger than some truck, but some truck is larger than every SUV.

6. (7 points each) Give fluent readings of the following sentences of *PLI*, using the symbolization key provided.

UD: Everything

f: Florida	s: the Supreme Court	Wxy: x wins y
g: Al Gore	e: the electoral vote	Fxyz: x makes y the winner in z
Px: x is a person		

a. (∼Fsgf ⊃ ∼Wgf) & (∀x)(Px ⊃ (∼Wxf ⊃ ∼Wxe))

b.(∃x)[((Px & Fsxf) & (∀y)(Fsyf ⊃ x = y)) & Wxe]