

Philosophy 240, Kenny Easwaran
Midterm 2, Sample 2

November 8, 2017

Name: _____

Section: _____

1. Validity. Make up an argument with the described premises and conclusion, or say why such an argument is impossible. (10 pts each)

(a) Valid, with one false premise, one true premise, and a false conclusion.

A sandwich is more expensive than a house. A house is more expensive than a car. Therefore, a sandwich is more expensive than a car.

(b) Invalid, with two false premises, and a true conclusion.

Reagan was president before Lincoln was born. Lincoln was president before Washington was born. Therefore Washington was president before Reagan was born.

(c) Valid, with two true premises, and a false conclusion.

This is impossible because a valid argument can't have true premises and a false conclusion.

2. Translations (10 pts each)

(a) Translate the following sentences from English into the formal language of Tarski's World.

i. If a is left of b, then it's in back of c but in front of d.

LeftOf(a,b) -> (BackOf(a,c)^FrontOf(a,d))

ii. a is a dodecahedron if and only if b is not.

Dodec(a) <-> ~Dodec(b)

iii. b is a tetrahedron only if either c or d is.

Tet(b) -> (Tet(c)vTet(d))

(b) Give ordinary English translations of the following sentences in the formal language of Tarski's World.

i. $\neg(\text{Small}(a) \wedge \text{Cube}(a)) \rightarrow \neg(\text{Small}(b) \wedge \text{Cube}(b))$

If a is not a small cube, then b isn't either.

ii. $(\text{Large}(a) \rightarrow \text{Cube}(a)) \wedge (\text{Small}(b) \rightarrow \text{Tet}(b))$

a is a cube if it's large, and b is a tet if it's small

iii. $(\text{Large}(c) \vee \text{Large}(d)) \rightarrow (\text{Dodec}(c) \vee \text{Dodec}(d))$

If either c or d is large, then at least one of them is a dodec.

3. Complete the following two incomplete proofs. Fill in the rule used on each line, and which prior lines it depends on. (20 pts each)

1	$A \vee C$	_____
2	$\neg(A \wedge D)$	_____
3	A	_____
4	D	_____
5	$A \wedge D$	\wedge Intro 3,4
6	\perp	\perp Intro 2, 5
7	$\neg D$	\sim Intro 4-6
8	$C \vee \neg D$	\vee Intro 7
9	C	_____
10	$C \vee \neg D$	\vee Intro 9
11	$C \vee \neg D$	\vee Elim 1, 3-8, 9-10

1	$A \rightarrow B$	_____
2	$B \rightarrow \neg A$	_____
3	A	_____
4	B	\rightarrow Elim 1,3
5	$\neg A$	\rightarrow Elim 2,4
6	\perp	\perp Intro 3,5
7	$\neg A$	\sim Intro 3-6

4. If the probability that *a* is medium given that it is a dodecahedron is 1/4, and the probability that it is medium given that it is *not* a dodecahedron is 1, and the probability that it is a dodecahedron is 2/3 then what is the probability that it is a dodecahedron given that it's medium? (20 pts)

To figure out the probability that *a* is a dodecahedron, given that it's medium, we will find the probability that it is a medium dodecahedron, and divide it by the total probability that it's a medium (whether a dodecahedron or not).

The probability that it is a medium dodecahedron is the probability that it is a dodecahedron times the probability that it is medium given that it's a dodecahedron. This is $(2/3) \times (1/4) = 1/6$.

2

The probability that it is medium but not a dodec is the probability that it is not a dodecahedron times the probability that it is medium given that it is not a dodecahedron. This is $(1 - 2/3) \times (1) = 1/3$.

Thus, the probability that it is a dodecahedron given that it's medium is $(1/6) / (1/6 + 1/3) = (1/6) / (1/6 + 2/6) = 1/3$

(Note: I used two different methods for the probability question on the two samples, but they are both ways of getting the same information, and either method will work for either problem.)