Midterm 2020 Solution

Ling 525

March 9, 2021

This midterm is due ...

1 Part one: Entailments

In part one of the midterm (and this review), each problem contains a pair of sentences. Let's call the first sentence (a) and the second (b). For each pair of sentences:

1.1. **First**, say whether sentence (a) **entails** sentence (b) or is **is entailed** by (b), or **both**, or **neither**. Saying they entail each other means you think they are logically equivalent.

1.2. If you say neither: (a) does not entail (b) and is not entailed by it), then you're done. For example, suppose we have

  a. Every dog barked.
  b. No dogs barked

  Here neither sentence entails the other, so you say "neither sentence entails the other." and you're done

1.3. If you say (a) entails (b) or (b) entails (a) or they are equivalent, then provide a **failed cancellation** of the entailed sentence. For example, suppose we have

  a. Sam got married.
  b. Sam married Susan.

I claim that (b) entails (a). To defend that claim, I construct the following failed cancellation.

(1) # Sam married Susan but he didn't get married.

This sounds contradictory, so cancellation fails to be felicitous, and that's evidence that (b) entails (a), so I've defended my claim. Suppose, just for fun, I tried the cancellation the other way, testing whether (a) entails (b):

Sam got married but didn't marry Susan.

That's fine (no contradiction), and that means that *Sam got married* does not entail *Sam married Susan*.

Note the # marking *Sam married Susan but he didn't get married*. This symbol generally means "pragmatically anomalous". The sentence as a whole contradicts itself and since we don't in normal communicative situations make self-contradictory statements, we call the statement pragmatically anomalous, that is, not used in normal communicative situations. That's different from syntactically anomalous (* *The seven brothers likes one another*) or semantically anomalous (*? John frightened sincerity*). When your attempt to cancel an entailment results in a contradiction, please signal that you have noticed this by marking the sentence with #.

If you say the two sentences entail each other, then you can cancel either one. One cancellation is sufficient.

Finally, discuss any **issues** that arose in formulating your answer. For example, (a) one or both of the sentences was ambiguous and you had to choose a reading, or (b) you had to make a specific assumption about the exact meaning of a word in (a) or (b).

2 Part one of the practice exam [50 ptr]

2.1. (a) Reginald ate red snapper and tuna.
   (b) Reginald ate tuna.
   (c) (a) $\rightarrow$ (b)
   (d) # Reginald ate red snapper and tuna but he didn't eat tuna,

2.2. (a) Sue mailed herself a brown package.
   (b) Sue mailed herself a package.
   (c) (a) $\rightarrow$ (b)
   (d) # Sue mailed herself a brown package, but she didn't mail herself a package

2.3. (a) Fred rented a bicycle from Lena.
   (b) Lena rented a bicycle to Fred.
   (c) (a) $\leftrightarrow$ (b)
   (d) # Fred rented a bicycle from Lena, but she didn't rent a bicycle to him.,

2.4. (a) I hit the vase with the hammer.
   (b) The hammer hit the vase.
   (c) (a) $\rightarrow$ (b)
   (d) # I hit the vase with the hammer, but the hammer didn't hit the vase.

2.5. (a) The mosquito died.
   (b) Alan killed the mosquito.
   (c) (b) $\rightarrow$ (a)
   (d) Alan killed the mosquito but the mosquito didn't die.

2.6. (a) Every house with more than two bedrooms sold that month.
   (b) Every house with more than one bedroom sold that month.
   (c) (b) $\rightarrow$ (a)
   (d) # Every house with more than one bedrooms sold that month, but not every house with more than two bedrooms sold.

2.7. (a) It's very cold.

(b) It's cold.

(c) (a) $\rightarrow$ (b)

(d) # It's very cold, but it's not cold

2.8. (a) No bagels were sold.

(b) No sesame bagels were sold.

(c) (a) $\rightarrow$ (b)

(d) # No bagels were sold, but some sesame bagels were sold.

> Note: This counts as a cancellation because *It is not the case that no bagels were sold* is logically equivalent to *Some bagels were sold.* In general, when canceling an entailment you need to find a way of negating it, and sometimes a logically equivalent sentence may sound more natural than a simple negation. You're encouraged to use the most natural negation you can. In this case, the usual syntactic means of negating a sentence both sounds unnatural and does not give us what we want semantically: *No bagels were not sold* seems to be equivalent to *All bagels were sold*. It certainly does not mean the same as *It is not the case that no bagels were sold*. If you are having trouble finding an adequate negation for a sentence S, "it is not the case that S" almost always works. But don't use "it is not the case that S" when a more natural negation exists. For example, don't use *It is not the case that Fido barked* in place of *Fido didn't bark.*

2.9. (a) Lucille may not have given the king a headache.

(b) The king may not have been given a headache by Lucille.

(c) Entailment in neither direction. But the judgments are difficult. Consider

(d) Lucille may not have given the king a headache, but the king may have been given a headache by Lucille.

(e) (d) is a little odd, but not contradictory. It seems to have the same truth conditions as the more natural *Lucille may not have given the king a headache, but she may have*

2.10. (a) Not everyone enjoyed the party.

(b) Someone didn't enjoy the party.

(c) (a) $\leftrightarrow$ (b)

(d) # Not everyone enjoyed the party, but it is not the case that someone didn't (enjoy the party).

3 Logic section of the practice exam [20 pts]

3.1. 4 items worth 5 pts apiece

3.2. 3 pts for the truth table and 2 points for correct classification of the truth table (equiv, tautology, or contradiction).

Consider the truth table for $\sim p \rightarrow \sim q$

p	q	$\sim p$	$\sim q$	$\sim p \rightarrow \sim q$
T	T	F	F	T
T	F	F	T	T
F	T	T	F	F
F	F	T	T	T

Answer the questions below about the following expressions.

$$\begin{array}{ll} (a) & q \rightarrow p \\ (b) & \sim (p \rightarrow (q \rightarrow p)) \\ (c) & \sim p \rightarrow (p \rightarrow q) \\ (d) & \sim (q \ \& \ \sim p) \end{array}$$

(1) p	(2) q	(3) $\sim p$	(4) (a) $q \rightarrow p$	(5) $p \rightarrow q$	(6) $q \ \& \ \sim p$	(7) (d) $\sim (q \ \& \ \sim p)$	(8) (c) $\sim p \rightarrow (p \rightarrow q)$	(9) $p \rightarrow (q \rightarrow p)$	(10) (b) $\sim (p \rightarrow (q \rightarrow p))$
T	T	F	T	T	F	T	T	T	F
T	F	F	T	F	F	T	T	T	F
F	T	T	F	T	T	F	T	T	F
F	F	T	T	T	F	T	T	T	F

3.1. Which of the above expressions is logically equivalent to ($\sim p \rightarrow \sim q$)? Prove your answer by showing truth tables for all of the above expressions.

3.2. Point out any of these expressions that are tautologies or contradictions and explain why using the truth tables.

Answers:

(a)	$q \rightarrow p$	equiv
(b)	$\sim (p \rightarrow (q \rightarrow p))$	contradiction
(c)	$\sim p \rightarrow (p \rightarrow q)$	tautology
(d)	$\sim (q \;\& \;\sim p)$	equiv

4 Translation section of the practice exam [30 pts]

Grading: 10 items worth 3 points each (max deduction per following):

a. -1 improper treatment of a proper noun
b. -1 wrong quantificational force (confusing $\exists$ with $\forall$).
c. -1 missing $\exists$ or $\forall$
d. -1 for each missing lexical predicate
e. -1 for predicate with wrong arity
f. -1 misplaced modifier (predicate with wrong args)
g. -1 predicate on wrong side of $\rightarrow$
h. -1 wrong connective with $\exists$ with $\forall$. (translating *every dog barks* as $\forall x\,[\,\text{dog}(x)\;\&\;\text{bark}(x)\,]$.)
i. -1 ambiguous constant (translating *Brad loves Buck* as $\text{love}(\text{b},\,\text{b})$.)
j. -2 Logical syntax error (illustrated below).

Translate the following sentences into predicate logic of the sort introduced in Allwood, Anderson, and Dahl, and further discussed in chapters 2 & 3 of Kearns. For any ambiguous sentences, give all the readings, and paraphrase them, saying which logical translation goes with which reading. Except where indicated otherwise, translate definite NPs and proper names using single letter constants. If you have an issue about how to translate a word, please **discuss** it and justify your decision, rather than just, say, ignoring the word and losing unnecessary points. If you feel that a predicate word is being used to denote more than one predicate, so that you need to give it more than one translation, please explain why. An example would be when you translate transitive and intransitive *eat* as EAT and EAT2.

4.1. Either Lee or Sandy wrecked the car (= Either Lee wrecked the car or Sandy wrecked the car).

$$\text{wreck}(\text{l}, \text{c}) \vee \text{wreck}(\text{s}, \text{c})$$

Logical syntax error (-2)

$$\text{wreck}(\text{l} \vee \text{s}, \text{c})$$

4.2. Bill mixed the rice and the beans. (= Bill mixed the rice and Bill mixed the beans)

$$\text{mix}(\text{b}, \text{rce})\ \&\ \text{wreck}(\text{b}, \text{bns})$$

Logical syntax error (-2)

$$\text{mix}(\text{b},\ \text{rce}\ \&\ \text{bns})$$

Plus one difficult to capture reading: *Bill mixed the rice and the beans together* (resulting in a mixture of rice and beans).

4.3. Rob talked to an angry solicitor.

$$\exists x\ \text{angry}(x)\ \&\ \text{solicitor}(x)\ \&\ \text{talk-to}(\text{r},\ x)$$

4.4. A tall building was destroyed by the earthquake.

$$\exists x\ \text{tall}(x)\ \&\ \text{building}(x)\ \&\ \text{destroy}(\text{e},\ x)$$

4.5. The bicycle was near the curb.

$$\text{near}(\text{b}, \text{c})$$

4.6. Tolstoy wrote no novels that sold well. (Treat *sell well* as a single predicate SELL-WELL).

$$\sim \exists x\ \text{novel}(x)\ \&\ \text{sell-well}(x)\ \&\ \text{write}(\text{t},\ x)$$

Or, equivalently (either answer good):

$$\forall x\ (\text{novel}(x)\ \&\ \text{sell-well}(x)) \rightarrow \sim \text{write}(\text{t},\ x)$$

4.7. Bill laughs at every bad joke.

$$\forall x\ (\text{joke}(x)\ \&\ \text{bad}(x)) \rightarrow \text{laugh-at}(\text{b},\ x)$$

4.8. Some Democrat from Virginia won the straw poll.

$$\exists x \text{ (democrat}(x) \ \& \text{ from}(x, \text{v}) \ \& \text{ win}(x, \ \text{sp}))$$

4.9. Bianca was surprised by Lucien. This could be a passive.

$$\text{surprise}(\text{l}, \text{b})$$

Or note that *surprised* can be an adjective (*Bianca was very surprised by Lucien*). Since being different part of speech means a different lexeme, the adjective has a different predicate from the verb:

$$\text{surprised}(\text{b}, \text{l})$$

But **not**

$$\text{surprise}(\text{b}, \text{l})$$

Either *surprised* is a verb and therefore a passive with the same predicate as the active, or it's an adjective with a new predicate,

4.10. The grocer selected a shiny eggplant.

$$\exists x \text{ (eggplant}(x) \ \& \text{ shiny}(x) \ \& \text{ select}(\text{g}, \ x))$$