LING645/CMSC723 Midterm 2
November 12, 1997

Name:

Please read through the <u>*entire*</u> *exam once before you start. Read carefully and make sure to answer every part of each question. You are encouraged to* <u>*show your work*</u> *so that partial credit can be assigned.*

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1. Reduce each of the following λ-expressions, and either give the truth value of the resulting expression (TRUE or FALSE), or explain why the truth value cannot be determined. [10 points]

(a) $\lambda x[2x + 3 = 13]\ 5$

(b) $\lambda x[\forall y[y > 7 \rightarrow x > (2y - x)]]\ 11$

(c) $\lambda x[2x + 3y = 15]\ 5$

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2. Let f, g, and h be the following λ-expressions:

f: $\lambda r(\lambda s(\lambda t.((rs)t)))$

g: $\lambda v(\lambda w.(vw))$

h: $\lambda z.z^2$

Completely reduce and give the value of (((f g) h) 2). [10 points]

3. Give a logical form (LF) or quasi-logical form (QLF), *using an event variable and thematic roles*, for each of the following sentences, in the style of Allen. Explain your choice for each thematic role. [15 points]

(a) John bought a dog for Suzy with a MasterCard.
Note: MasterCard is a kind of credit card.

(b) Edgar detests sushi.

(c) We jogged across the street to a concert.

4. Consider the following data, concerning the *middle alternation*:

(1) a. The maid broke the vase.
    b. The vase broke easily.
(2) a. The child sipped the milk.
    b. *The milk sipped easily.
(3) a. The child spilled the milk.
    b. The milk spilled easily.
(4) a. The clown frightens children.
    b. Children frighten easily.
(5) a. Dogs enjoy bones.
    b. *Bones enjoy easily.

(a) Both *frighten* and *enjoy* involve psychological or emotional states. Why does *frighten* participate in the middle alternation when *enjoy* does not? [5 points]

(b) Both *spill* and *sip* denote physical actions involving a liquid. Why does *spill* participate in the middle alternation when *sip* does not? [5 points]

(c) Consider the following LCS-like semantic representations:

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[i]     (CAUSE y (BECOME x <STATE>))
        ``y causes x to become <STATE>''

[ii]    (BECOME x <STATE>)
        ``x becomes <STATE>''

[iii]   (CAUSE y (GO x (TO z) (in-manner <MANNER>)))
        ``y causes x's going to z in a particular manner, <MANNER>''
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Representation (i) is a plausible lexical representation for the verb *spill*, as in "Mary spilled the milk" (since the meaning involves Mary causing the milk to change its state to SPILLED); on at least one sense of the verb, *y* corresponds to an AGENT thematic role, and *x* is the THEME.

Now it's your turn: for representations (ii) and (iii), give *TWO different verbs* in English that could plausibly have that representation for some sense of the verb. Illustrate by giving the verb in a sentence where that representation would be used, AND name the thematic roles for x and/or y and/or z. *If you can only come up with a suitable verb in some other language, give the verb in that language, but clearly explain, in English, its meaning.* [15 points]

Answers for representation (ii):

Answers for representation (iii):

5. Consider the following syntactic rules and lexical entries:

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(S (SEM (?semnp ?semvp)))  -->  (NP (SEM ?semnp)) (VP (SEM ?semvp))
(NP (SEM (?semdet ?semn))) -->  (DET (SEM ?semdet)) (N (SEM ?semn))
(VP (SEM ?semvi)) --> (VI (SEM ?semv))
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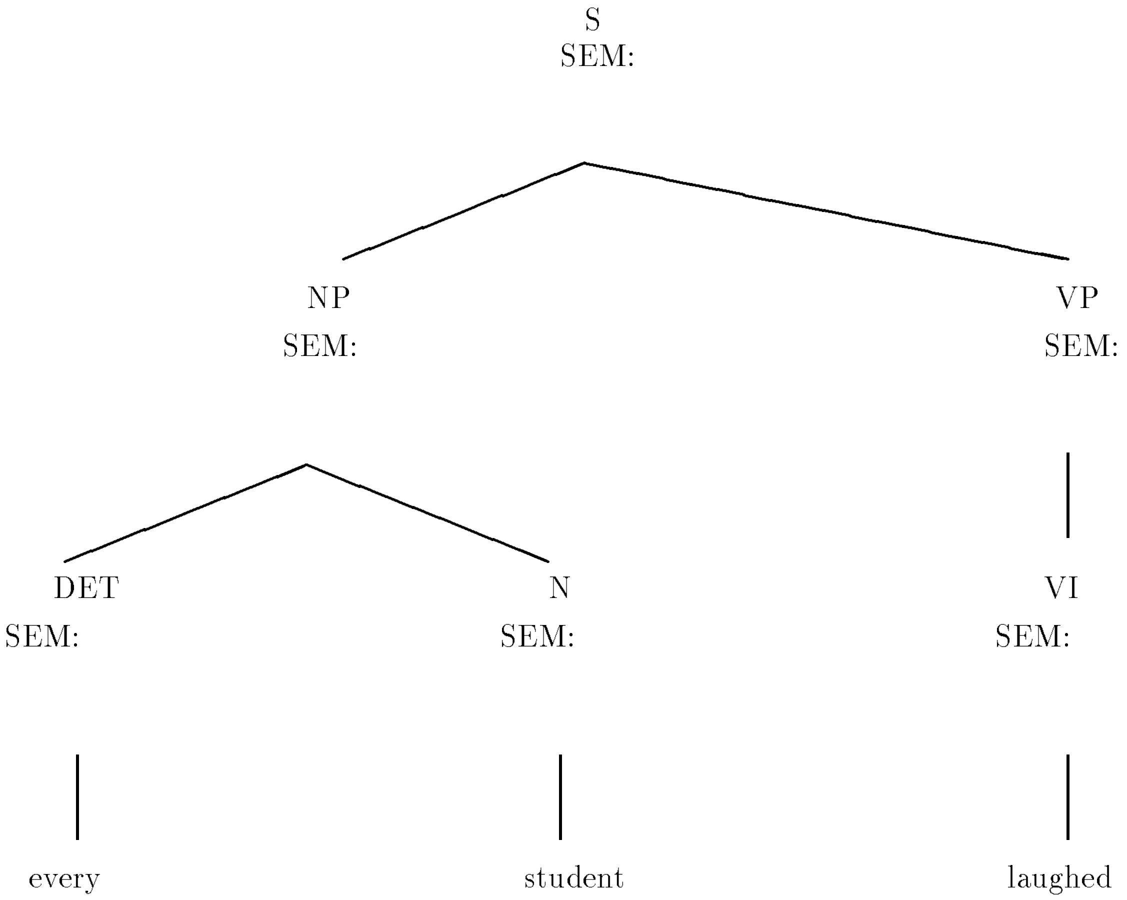
student: (N (SEM $\lambda z.\mathrm{STUDENT}(z)$))

laughed: (VI (SEM $\lambda y.\mathrm{PAST}(\mathrm{LAUGH}(y))$)

every: (DET (SEM $\lambda Q(\lambda P.\forall x(Q(x) \rightarrow P(x))))$)

(a) For each node with an empty SEM value in the parse tree below, fill in the SEM value. Make sure all λ-expressions are completely reduced. [20 points]



(b) Assuming the above grammar and lexicon, give a lexical entry for the determiner *no*, as in "No student laughed". [5 points]

(c) Suppose we want to add the rule VP → VP ADV to this grammar, e.g. to handle "John laughed quietly". What would the rule look like with the SEM values included, assuming *quietly* had semantics $\lambda P.\text{QUIETLY}(P)$? [5 points]

- ☐ 1a ___________
- ☐ 1b ___________
- ☐ 1c ___________
- ☐ 2 ___________
- ☐ 3a ___________
- ☐ 3b ___________
- ☐ 3c ___________
- ☐ 4a ___________
- ☐ 4b ___________
- ☐ 4c.ii ___________
- ☐ 4c.iii ___________
- ☐ 5a ___________
- ☐ 5b ___________
- ☐ 5c ___________