Mock Exam

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You have to reach more than 50% of the points to pass. The mock exam is based on *MacBeth*, our real exam will be using the *Harry Potter*-scenario.

1 Predicate Logic

Task 1: Ambiguous sentences (7 points)
Consider the following ambiguous sentences:

(1) a. Duncan trusted Macbeth because he was a thane.
b. Every king trusts a thane.
c. Macbeth and Macduff are married.
d. Macbeth killed a king with a dagger.

1. For **each** of these, determine the type of ambiguity.
2. Pick **one** of the sentences provide an unambiguous paraphrase for the possible readings.

Task 2: Model and Interpretation (7 points)

1. Define a universe that consists of Macbeth and Banquo.
2. Define the interpretation of the names **macbeth** and **banquo** in an intuitively plausible way.
3. Define the interpretation of the properties $\mathbf{thane}_1$, $\mathbf{king}_1$, and $\mathbf{witch}_1$ is such a way that Macbeth is a king, both are thanes and neither is a witch.
4. Define the interpretation of the 2-place relations $\mathbf{mistrust}_2$ and $\mathbf{kill}_2$ in such a way that Macbeth and Banquo mistrust each other and Macbeth kills Banquo.

Task 3: Formulæ (7 points)
Write down logical formulæ that express the meaning of the following sentences.

1. Banquo is a thane.
2. Macbeth is king and Macbeth mistrusts Banquo.
3. If Banquo is king then Macbeth does not kill Banquo.

Task 4: Interpreting formulæ (8 points)
Compute the interpretation of the following formulæ step by step.

1. $\mathbf{mistrust}_2(\mathbf{macbeth}, \mathbf{macbeth})$
2. $\neg\mathbf{king}_1(\mathbf{banquo})$
3. $\mathbf{witch}_1(\mathbf{banquo}) \supset \mathbf{king}_1(\mathbf{macbeth}))$

Task 5: Variables (2 points)
Provide a g-function that maps the variables x, y, and z to individuals from the universe and compute the interpretation of the following formula with respect to the model and your g.

(i) $\mathbf{kill}_2(z, x)$

Task 6: Quantifiers
Provide logical formulæ that expresse the meaning of the following sentences. Are the formulæ true in **your** model (not in the entire play)? Give a short reason (you don't need to compute the truth value).

1. Banquo was killed by a king.
2. Macbeth mistrusts every witch.

2 Lexical Resource Semantics

Task 7: Analysis: Lexicon
Provide the lexical entries for the words in the sentence *Banquo mistrusted Macbeth.* Use the features as given in figure 1.

$$\begin{bmatrix} \textsc{phon} & ??? \\ \textsc{head} & ??? \\ \textsc{subj} & ??? \\ \textsc{spr} & ??? \\ \textsc{comps} & ??? \\ \textsc{dr} & ??? \\ \textsc{ex-cont} & ??? \\ \textsc{parts} & ??? \end{bmatrix}$$

Figure 1: Features used in AVMs

Task 8: Analysis: Syntactic structure and semantic combinatorics (15 points)
Using the lexical entries from Task 7, provide the syntactic structure of the sentence *Banquo mistrusted Macbeth.* Indicate **all** the values for all features at each node in the tree.

Task 9: General mechanisms of LRS (12 points)

1. Enumerate all possible logical forms that would be compatible with the PARTS list of the sentence from Task 8.
2. Use the PARTS value from Task 8 to show that the following expressions are excluded as possible logical forms of the sentence.
   (a) $\mathbf{mistrust}(\mathbf{macbeth}, \mathbf{banquo}, \mathbf{banquo})$
   (b) $\mathbf{mistrust}(\mathbf{banquo}, \mathbf{banquo})$
   (c) $\mathbf{macbeth}(\mathbf{mistrust}, \mathbf{banquo})$

Task 10: Linking (5 points)

1. Provide the full lexical entry of the verb from the sentence in Task 7 in such a way that it includes the **linking information**.

Appendix: Principles of Grammar

Phonology Principle In every phrase, the PHON value of the mother is a concatenation of the PHON values of its daughters.

Head Feature Principle In every headed phrase, the HEAD value of the phrase is identical with the HEAD value of the head-daughter.

Head-Subject Structure In every head-subject structure,

- the PHON value of the phrase starts with that of the non-head daughter,
- the valence lists of the phrase (SUBJ, SPR, COMPS) are empty,
- the COMPS and the SPR lists of the head-daughter are empty,
- the SUBJ list of the head-daughter contains exactly one element, which is identical with the nonhead-daughter.

Head-Complement Structure In every head-complement structure,

- the PHON value of the phrase starts with that of the head daughter,
- the COMPS ist of the phrase is empty,
- the SUBJ and the SPR lists of the head-daughter are identical with those of the phrase,
- the COMPS list of the head-daughter is non-empty and its elements are identical with the nonhead-daughters.

LRS Projection Principle In every phrase,

- the PARTS list of the phrase contains exaclty all elements of the PARTS lists of the daughters,
- the EX-CONT value of the phrase is identical with the EX-CONT value of the head-daughter.

External Content Principles In every utterance,
the EX-CONT value is a semantic expression that consists exactly of the elements of the utterance's PARTS lists.

Local Content Principle In ever phrase, the DR value of the phrase is identical with the DR value of the head-daughter