Meaning and Computation - Exercise 3

Question 1:

In formal semantics, we call an adjective **A** *intersective* if when it applies to a noun **N**, the meaning of the phrase is $D(A) \cap D(N)$, where $D(X)$ is the denotation of *X*, i.e., the set of elements that satisfy the relation *X*.

For example, if we're querying for all the rivers in Texas, we might want to query for Q1=$\lambda x. \text{river}(x) \wedge \text{in}(x, \text{Texas})$. If *10m-wide* is intersective, then for querying for all the 10m-wide rivers in Texas, we can simply take the output of Q1 and intersect it with the output of Q2=$\lambda x. \text{width}(x) > 10$.

1. Give three examples of adjectives that are intersective, and three examples of domains and adjectives that are not intersective. You may restrict your example to an adjective in a particular sense.
2. Are physical color adjectives (e.g., "brown", "red") usually intersective? Give an example where they are not.
   Note: the example should be one where the color adjective is used in its physical color sense, and not cases like "red herring", where "red" is part of an idiom.
   Hint: for an adjective to be intersective, its semantics is independent of the noun it is applied to.

Question 2:

Read the paper:

Vector-based Models of Semantic Composition
Jeff Mitchell and Mirella Lapata, ACL 2008
https://www.aclweb.org/anthology/P/P08/P08-1028.pdf

1. Summarize the main point of the paper in one or two paragraphs.
2. Compare the approach detailed in the paper to the distributional lexical semantic approach and to the compositional semantic approach we discussed in class.
3. Based on the model in the paper, propose a technique for measuring how compositional an adjective+noun phrase is. That is, it should ideally give a high score to "heavy suitcase" but a low one to "red herring".
4. Read the paper:
   Detecting Compositionality of Multi-Word Expressions using Nearest Neighbours in Vector Space Models
   Douwe Kiela and Stephen Clark, EMNLP 2013
   https://www.aclweb.org/anthology/D13-1147

   Compare the approach you proposed in question 2.3 to the approach in this paper. In what ways are they similar and where do they differ?