1. Please explain the fundamental concepts in probabilistic model, and show the initial and feedback search based on this model. (20 points)

2. Specify the basic vector space model and generalized vector space model. Discuss the differences between these two models and show the impact of generalized vector space model. (20%)

3. The same concepts can be represented by human in different ways. Query terms and index terms of the relevant documents may not be always the same, so that direct keyword matching may not be workable to retrieve those documents satisfying users’ needs. Please discuss how to construct ontology and employ it for concept-based retrieval. (20 points)

4. In real world, document collections are composed of documents in more than one language. Cross language information retrieval (CLIR) facilitates the use of queries in one language to access documents in other languages. Please propose a CLIR system to deal with this problem. (20 points)

5. Annotating images with text is quite popular in Internet. Please discuss how to select features from image and text, how to annotate images with text, and how to apply the two types of complementary features for effective retrieval. (20 points)