Botany 400 – Plant Systematics
Potential questions for Exam 3

1. The Asterids (excluding the Lower Asterids) are one of the best defined groups of flowering plants. Indicate clearly (1) how they can be separated from Rosids, and (2) how the Lower Asterids differ generally from the typical Asterids.

2. Certain features within the Asterids are fairly good in defining subgroups (orders or sets of families), although most show some homoplasy. Discuss how the following features tie together orders or families: (a) inferior ovary, (b) pollen presentation, (c) opposite leaves, (d) tendency for congested inflorescences (head-like).

3. If you are holding a radiate head like a sunflower, describe all the structures (bracts, florets, etc.) you will see from the outside to the inside.

4. The "primitive" monocot flower is considered to possess 3 sepals, 3 petals, 6 stamens, 3+ separate carpels with nectar and insect pollination. Give **two** examples, one in Alismatoids and one in Commelinoids, how floral reduction and loss of insect/nectar pollination is a recurrent theme in monocot evolution. Indicate **both** the type of pollination and the change in flowers/inflorescence that have accompanied the shift in pollination.

5. The ancestral aquatic monocot (now extinct of course) has been argued to have possessed leaves without blades and an inactive vascular cambium (for secondary growth). If this is correct, describe how monocots have been successful in dealing with both of these deficits.

6. What are some of the intrinsic and extrinsic features of orchids that have apparently driven their extraordinary diversification (Givnish et al. 2015 paper)?

7. Compare and contrast the inflorescence structure, bracts, and florets of a typical grass like *Avena* (oats) and *Carex* (sedge).

8. Vicariance and dispersalism are often considered to be the two main paradigms of historical biogeography. Using *Fuchsia* from the new world and old world, discuss how the two are involved in determining where species of *Fuchsia* are presently found.

9. The temperate and tropical floras of the southern hemisphere show different patterns of floristic linkage among South America, Africa, and Australasia. Using continental drift arguments, indicate which pair of continents are more floristically similar for (a) temperate and (b) tropical regions.

10. Molecular systematics, although clearly important in modern phylogenetics, has several issues that must be recognized and dealt with. Explain how gene duplications, hybridization, and horizontal gene transfer occur and what must be done to recognize their occurrence. – this question not covered in lecture

11. Define "Adaptive Radiation" and illustrate this phenomenon with the following examples: (a) *Salvia* (sages) of mint family; (2) Hawaiian Lobeliaceae.

12. How has molecular phylogenetics impacted the field of ecology – examples given in class lectures and in Crisp et al. paper.