This is a mock exam representing some of the types of problems you can expect to see on Exam 3. This is not all-inclusive, but provides a good idea of some of the things you can expect, and the concepts that are important.

1. Provide, in one or two sentences, definitions for the following rules/terms.

(a) Markovnikov’s Rule

(b) Zaitsev’s Rule

(c) Bromonium Ion

(d) Carbene

(e) Carbonyl

(f) Protecting Group

(g) Peroxy Acid
2. Provide the major product expected for the following organic reactions:

- **1. 3eq. NaNH₂**
  - **2. H₃O⁺**

- **Pr⁺**
  - **1. OsO₄, pyridine**
  - **2. Na₂SO₃/H₂O**

- **MCPBA**
  - **1. O₃, CH₂Cl₂**
  - **-78 °C**
  - **2. Zn/HOAc**

- **CH₂I₂, Zn(Cu)**

- **Br₂, CH₂Cl₂**
  - **0 °C**
3. Draw a valid Lewis Structure for diazomethane (CH2N2) and include two valid resonance structures.

4. Draw an INTERMEDIATE expected in the following reactions with 2,3,3-trimethylbutene as the substrate:

(a) Hydroxymercuration/Demercuration

(b) Alkoxymercuration/Demercuration

(c) Hydroboration/Oxidation

(d) KMnO₄ Oxidative Cleavage
5. Show how you would synthesize the following ethers using the Williamson ether synthesis:

6. Choose an appropriate reducing agent for the following transformations:
7. What is the oxidation state of the indicated carbon ("C") in the following compounds?

8. Provide a mechanism for the reaction of concentrated HBr with 2-butanol. What would be the product(s) of reaction of (1) PBr₃ and (2) SOCl₂ with 2-butanol?

9. Show reactions that would convert the hydroxyl group of cyclohexanol into (1) a good leaving group and (2) a silyl ether (a protecting group)
10. Provide plausible synthetic routes that will transform the following organic molecules into the indicated products (multiple steps may be involved).

We’ve looked at many other reactions in Chapters 8, 11 and the first part of 12. All of these are not included in this mock exam, but this covers a good portion of the highlights. You should be familiar with all of the reactions (and any given stereo/regiochemistry) and mechanisms where these were discussed in class).