Math 303 Sample Exam Questions Round 2

Here are some sample questions for the second exam. This list is not comprehensive. It is meant to give you a feel for the kind of questions that could be on the exam. You are responsible for knowing all the theorems and propositions we did in class and that were in your reading (including the ones we did not do in class). This means you must be able to state and prove them.

Any of the homework exercises or an exercise similar to those could show up on the exam. I may ask you about any of the constructions presented in class too.

1. What is inductive reasoning? Give an example. What role does inductive reasoning play in math? What are its pitfalls?
2. What is deductive reasoning? Give an example. What role does deductive reasoning play in math?
3. What exactly did Hippocrates show about the quadrature of the lune? When and where did Hippocrates live?
4. What does it mean that the quadrature of the circle is impossible? What exactly is it that we cannot do with the circle?
5. What are transcendental numbers and what do they have to do with straightedge and compass constructions?
6. How do we know that the quadrature of the circle is impossible? What does this have to with the number π? What result about π is the key to proving the impossibility of the quadrature of the circle? Who proved this result. When and where did that person live?
7. Who was Eudoxus and what major mathematical results do we associate with his name? When and where did he live?
8. Euclid collected the mathematical knowledge of his day in his Elements and added some of his own results. Why do we consider the Elements a milestone in the history of math? When and where did Euclid live?
9. State Euclid's five postulates (axioms).
10. State Euclid's five common notions.
11. Discuss the advantages of the kind of axiomatic framework Euclid developed in his Elements. Why do we need axioms (postulates)? Why do we want to build our theorems on axioms?
12. What is the "continuity postulate" and what is its significance? Is this one of Euclid's five postulates?