Mathematics 163 Name: _____

February 19, 2010

SAMPLE SECOND MIDTERM EXAMINATION

Please use no notes and no books. Please use no calculators and no other electronic devices. Give complete answers; in particular, show calculations.

1. Use the Euclidean Algorithm for these problems.
(a) Find the greatest common divisor of 208 and 897, that is, find the $\gcd(208,897)$.
(b) Find a pair of integers x and y such that $41 = x \cdot 208 + y \cdot 897$
or prove that there is no such pair of integers.
(c) Find a pair of integers x and y such that $39 = x \cdot 208 + y \cdot 897$
or prove that there is no such pair of integers.

2. The ancient Greeks were particularly interested in three straight edge and compass construction problems.
(a) Briefly describe the Delian problem.
(b) Indicate a solution that involves more than straight edge and compass.
(c) Indicate the part of your answer to part (b) that means that the solution fails to be a straight edge and compass construction.

3. The following questions relate to the treatise by Euclid, Elements.
(a) Euclid's treatise does not meet current standards for mathematics. There are times in Book I that Euclid make a tacit assumption. Briefly describe four such examples.
(b) Despite such imperfections the treatise was held in highest regard for at least two thousand years. Describe four important qualities that contributed to it being such a successful book.

4. Assume that there is a number $\sqrt{3}$ such that $\left(\sqrt{3}\right)^2 = 3$. Prove that $\sqrt{3}$ is not rational.

5. Put the appropriate letter and numeral after each name.

Proclus	_____	_____
Eratosthenes of Cyrene	_____	_____
Euclid	_____	_____
Eudoxus of Cnidos	_____	_____

I. 408-355 BC II. fl. 300 BC III. fl. 230 BC IV. AD 410 – 485
A. Introduced an abstract theory of ratios, invented the method of exhaustion
B. Wrote an important commentary on Book I of Euclid's Elements
C. Developed a sieve to find prime numbers, estimated the circumference of earth
D. Compiled a large portion of Greek mathematical knowledge

6. State and prove a proposition in Euclid's Elements that is an example of "geometrical algebra."