Math 406-Practice Midterm 1 Name:

1. (20 points) Find the gcd of $a = 51$ and $b = 87$. Express the answer as a linear combination of a and b.

2. (20 points) Find the least common multiple of 111 and 303.

3. (20 points) Is it possible to have 100 coins, all of which are pennies, dimes or quarters with a total value of exactly \$5?

4. (10 points) Suppose a,b,c,d are integers such that b and d are positive and $(a,b) = (c,d) = 1$. Suppose $a/b + c/d$ is an integer. Show that $b = d$.

5. (20 points) Show that $2^{90} \equiv 1 \pmod{209}$. **Hint:** $209 = (11)(19)$.

6. (10 points) Find an integer x such that $-110 \leq x \leq 110$ and

$$x \equiv 5 \pmod{13}$$
$$x \equiv 9 \pmod{17}.$$

Math 406 Practice Midterm 1 Fall 2012

Patrick Brosnan, Instructor

First Name/Last Name:_____

Student ID Number:_____

Section/Professor:_____

Signature: By signing here, you confirm you are the person identified above and that all the work herein is solely your own.

Instructions:

(1) No calculators, books, notes, or other aids allowed.
(2) Give your answer in the space provided. If you need extra space, use the back of the page. **PLEASE BOX ALL FINAL ANSWERS!** And **clearly indicate whether you are planning to prove a statement or give a counterexample at the beginning of the problem.**
(3) Show enough of your work to justify your answer. Show ALL steps.

Problem	Points	Score
1	20	
2	20	
3	20	
4	10	
5	20	
6	10	
Total	100	