MATH 306: Introduction to the History and Philosophy of Mathematics
Spring 2017
Thursday May 4, 2017
Final Exam — Part I

NAME:_____

This part contains 1 question worth 24 points. It is closed-book, closed note. You should spend no more than 30 minutes on this section. When you have finished, turn in Part I and you will be given Part II. You have a total of 2 hours for Part I and Part II together.

1. (3 points each) For each mathematician listed below, state about when they lived, about where they lived, and describe their most significant mathematical contributions (at least two).

   (a) Zeno (when: _____) (where: _____)

   (b) Diophantus (when: _____) (where: _____)

   (c) Omar Khayyam (when: _____) (where: _____)

   (d) Gerolamo Cardano (when: _____) (where: _____)

(e) Rene Descartes (when: _____) (where: _____)

(f) Pierre Fermat (when: _____) (where: _____)

(g) Issac Newton (when: _____) (where: _____)

(h) Janos Bolyai (when: _____) (where: _____)

MATH 306: Introduction to the History and Philosophy of Mathematics
Spring 2013
Thursday May 9, 2013
Final Exam — Part II

NAME:_____

This part contains 4 questions worth 76 points plus and extra credit problem worth 2 points.

1. (15 points)

   (a) Use the method of double false position to solve the following problem:

   A purse of 100 dollars is to be divided among 5 people (A,B,C,D and E) so that B may have twice that of A. Person C may have only half that of A. Person D may have 3 more dollars than C. Finally E should have 25 dollars. How much does each person receive?

   (b) What type of problem can be solved using the method of double false position?

   (c) How old is this method?

2. (15 points) The following is Problem 10 from Book II of Diophantus' *Arithmetica* as translated by Thomas Heath.

> To find two square numbers having a given difference.
>
> Given difference 60.
> Side of one number x,
> side of the other x plus any number the square of which is not greater than 60, say 3.
> Therefore, $(x+3)^2 - x^2 = 60$;
> $x = 8\frac{1}{2}$, and
> the required squares are $72\frac{1}{4}$, $132\frac{1}{4}$.

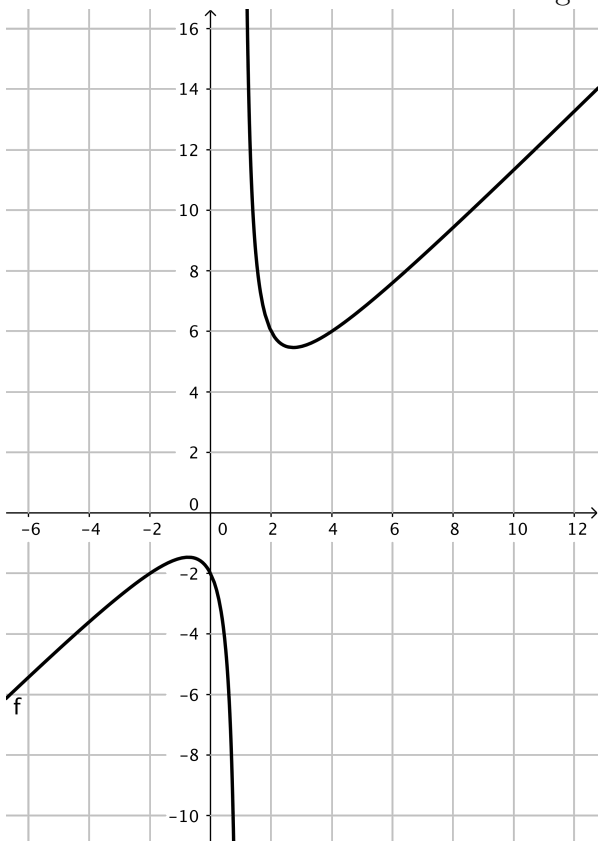
(a) Use Diophantus' explanation to solve the same problem but with a difference of 7 instead of 60.

(b) Solve Problem 10 from Book II using modern notation and strategies. Assume there are no restrictions on the type of solutions.

(c) Give at least two reasons why Diophantus' approach is do different from our modern one.

3. (15 points)

(a) Use Fermat's method to find the subtangent, t of the curve $x^2 + y + 2 = xy$, graphed below.



(b) Use the formula in part (a) to find the subtangent, t, for the curve when $x = 2$ and $y = 6$ **AND** draw this particular subtangent on the graph above.

4. The following EIGHT questions are short answer. You DO need to use complete sentences. In length, your answers should range from a couple of sentences to a modest paragraph. In all cases, be specific, precise and *answer the question. Don't just write stuff related to the topic.*

   (a) (3 points) A modern precalculus text introduces the logarithm as the inverse of an exponential function. Explain how the origins of the logarithm are very different from this modern view.

   (b) (4 points) Describe how the coordinate geometry of Descartes and Fermat was rather different than our modern version.

   (c) (4 points) Describe how Omar Khayyam's solution to the cubic and Girolamo Cardano's solution to the cubic were different.

(d) (4 points) Explain why the 5th Postulate in Euclid's *Elements* received so much attention from mathematicians.

(e) (4 points) Explain why Newton and Leibniz generally get credit of the development of modern calculus **AND** describe how their calculus was different from what appears in a modern textbook.

(f) (4 points) Describe several contributions to mathematics made by Islamic scholars **AND** how these influenced later mathematicians.

(g) (4 points) Describe the *mathematical* concerns articulated in Zeno's paradoxes.

(h) (4 points) Give a punctuated description of the development of algebraic notation. Include specific examples, names and dates.

EXTRA CREDIT (2 points) Of all the topics covered in this course, which one did you find most interesting?