

## Monday, December 7

1. Tutorials will be given on Thursday, December 17 and Monday, December 21, both starting at 2:00. The classroom will be announced on my office door (BH 927).
2. As we discussed, the exam will include the *option* of an essay, in lieu of two numbered questions. (It is not compulsory to write an essay.)

There will be two essay topics to choose from. One is “Ancient astronomy, from the earliest times to Ptolemy”; the other “The solution of the cubic equation”. The essays must be based on the material in our textbook; additional material is appropriate only in addition to the required minimum amount of material from the text: 800 words.

The exam is a closed book exam; you will have to write from memory.

The first essay topic will be familiar from assignment 6. For the second, look up section 12.3 (p. 399), and also, section 9.3 from chapter 9, The mathematics of Islam, and also, some parts of 12.4 (Francois Viete).

## Tuesday, December 1

Some (more) remarks on assignment 9.

1. Today it was pointed out to me that there is a (small) mistake in [2] 1): you have to require, in addition to what is already there, that  $a \neq 1$ . You can visit the corrected text to see the full corrected problem.
2. In problem [3], the numbers are not nice. This should not be a problem though. When you have a square root of a large number, for instance, in your further work you should abbreviate it by a letter (one that is not used for another thing!). The results of the questions may be given as quadratic irrationalities (familiar from assnmts 7 and 8); they do not have to be simplified and/or expressed as decimal approximations. These remarks apply to all parts of question [3].
3. Hints for part 7) and 8): once you have the equations of the principal axes, say in  $u, v$  coordinates (from part 4)), you have to intersect those axes with the ellipse  $u^2 + v^2 = 1$ . You get four points

$$Q_1[u_1, v_1], Q_2[u_2 = -u_1, v_2 = -v_1], Q_3[u_3, v_3], Q_4[u_4 = -u_3, v_4 = -v_3]$$

$Q_1$  and  $Q_2$  on one of the principal (symmetry) axes,  $Q_3$  and  $Q_4$  on the other. The first semi-axis  $a$  equals the length of  $OQ_1$  (equals the length of  $OQ_2$ ), the other  $b = OQ_3$  (there is no saying that  $a$  should be greater than  $b$ ).

Note, however, that the length of a segment can be calculated in the standard way only in a Cartesian system. Therefore, to get the length of  $OQ_1$ , you have to get the coordinates of the points  $O$  and  $Q_1$  in the  $x, y$  system. Remember through all this that little actual calculation is ever needed: you express quantities as quadratic irrationalities; simplifying expressions is optional.

Remember that the foci of the ellipse are the points  $F_1$  and  $F_2$  that are on the *longer* one of the two principal axes, so that their distance from the centre is  $c = \sqrt{b^2 - a^2}$  when  $a < b$  and  $c = \sqrt{a^2 - b^2}$  when  $a > b$  ( $c = 0$  when  $a = b$ : we have a circle: there is just one focus, the center). Therefore, if the  $u, v$  coordinates of  $Q_1$  (for  $Q_1$ , see above) are  $Q_1[u_1, v_1]$ ,  $a = OQ_1$ , and  $a > b$ , then the  $u, v$  coordinates of  $F_1$  are  $F_1[\frac{c}{a}u_1, \frac{c}{a}v_1]$ : the vector  $OF_1$  equals  $OF_1 = \frac{c}{a}OQ_1$ .

4. *On tangents* (par 6): A line is a **tangent** to an ellipse if the line has exactly one common (intersection) point with the ellipse.

Therefore, to solve the problem, you set up the tangent line  $v - v_0 = m(u - u_0)$  through the given point  $A(u_0, v_0)$  with an unknown, soon-to-be-found parameter  $m$ . You calculate the intersection point(s) of this line with the ellipse. Since one obtains a quadratic equation for the  $u$ -coordinate of the intersection point, there are three possibilities: depending on the value of  $m$ , there are zero, one or two solutions intersection points. When you have exactly one solution, you have a tangent. There will be two tangents through the given point  $A$ .

### Monday, November 30

Answers to assnmt 7 are posted

### Wednesday, November 25

Another change in assignment 9! In part 3) of problem [2], my original instructions were wrong (the assertion to be proved is obviously right, however). Now I have made the question into one “*for bonus marks only*”.

### **Monday, November 23**

Please see the revised version of assignment 9. Part 3) of question [2] has been given more detailed instructions. The text (notes) between questions [2] and [3] has been expanded, and some of the formulas have been corrected. In [3], some words of explanation were added.

### **Friday, November 20**

Assignment 9 is posted

### **Friday, November 13**

Assignment 8 is posted

### **Monday, November 9**

“Subject: Course evaluation for MATH 338, MATH 133 now available to students!

Course evaluation(s) are now available to your students for completion on MINERVA!

There has been great concern about increasing response rates for course evaluations. To assist with this, we have drafted a PowerPoint message that you can use during classes to encourage your students to respond. It is very important to remind students to fill in course evaluations. Click here to access the PowerPoint slides:

<http://www.mcgill.ca/tls/courseevaluations/mercury/announcement/>”

The message is posted, also, separately on this site (scroll down on the site).

### **Thursday, November 5**

The midterm questions, and answers to them, are posted.

### **Tuesday, November 3**

Assignment 7 is posted

### **Thursday, October 29**

1. Answers to assnmt 5 are posted.
2. **Calculators** will be allowed, in fact, they will be *necessary*, at the midterm. They must be used for calculating with integers that could be quite large.

### **Wednesday, October 28**

Some misprints from question [19] in the second set of sample questions have been removed; you may want to see the revised version.

### **Monday, October 26**

**Assignment 6:** It is given as a choice between two alternatives:

*First choice:* Essay of 1,500 to 2,000 words, entitled:

*“Ancient Greek astronomy and its mathematics”.*

The essay is to be based on sections 5.1 and 5.2 of the text. This part of the book is about 23 pages long. Quantity-wise, the essay is a reduction by a factor of about one-tenth (the result being about two pages of the printed text of the book).

*Second choice:* **Solve** 10 exercises out of the following list (the “astronomical” exercises): Exercises **8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 28, 29** on pages 168 and 169.

**Assignment 6 is due: Wednesday, November 4.**

### **Sunday, October 25**

Another (smaller) set of sample questions have been posted.

**Sunday, October 18** (later in the evening)

Please see a correction on pages 1 and 3 of assnmt 5 (in red; the same mistake twice).  
Thanks to Mr. Kuo-Wei Lu.

**Sunday, October 18**

Posted are: answers to assnmt 3; and “Sample questions for exams, installment 1”.

Questions, comments are (more than) welcome. It is better to bring your questions to office hours than to pose them in e-mail – but I will try to reply to e-mails too.

**Friday, October 16** (later in the day)

Assignment 5 is posted.

**Friday, October 16**

I received the following message:

“Please take note that the **midterm** exam for MATH 338 has been booked for Monday November 2, 2009 from 6 to 9 pm in STBIO N2/2. You are priority #2. Priority #1 is CHEM 110.”

The midterm is a 2-hour exam. The room is booked for 3 hours so that we don't have to rush at the end.

The material for the midterm are from:

- 1) the five assignments (assignment 5 is about to be posted; so are answers for the assignments);
  - 2) short historical questions;
- and
- 3) definitions, theorems, and proofs given in classroom lectures;

For 2) and 3), I will shortly post sample questions.

There will be a possibility to choose which questions you answer. You will be asked to answer about one half of the questions given on the exam text. Details on how this is done will be given at the exam itself.

### Wednesday, October 14

There was a mistake in assnmt 2, and one in assnmt 3; neither had much effect on your work on the assignments. I thank Mr. Nashaat for noting the second mistake.

The *first* one is a misprint in assnmt 2, on page 1, in formula (1). The mistake is that the exponent in the numerator should be  $2^n$ , rather than  $2n$ . In other words, the right formula is

$$b_n < \frac{b^{2^n}}{(4N)^{2^n-1}} .$$

Usually, we have  $b < 1$ , in which case this is a *stronger* formula than the original one; in other words, the original was also right, except that we could have said something better. The reason is that for  $n=2,3,\dots$   $2n < 2^n$ , and so for  $b < 1$ ,  $b^{2^n} < b^{2n}$ .

The *second* mistake was more serious. In assnmt 3, part 2) of problem [2] is not correct as it is stated: one has to suppose that the triangle we begin with is *acute-angled*: all angles of it are less than  $90^\circ$ .

If the triangle is a right triangle (one of its angles is  $90^\circ$ ), then its orthic triangle degenerates into a single point. If the triangle has an obtuse angle, then its orthocenter is not the incenter, but an *excenter*, of the orthic triangle. There are three excenters of a triangle. An excenter of a triangle is the center of a circle that touches the *lines* of all three sides of the orthic triangle, but two of them *outside* the triangle.

Concerning the “problem with  $\sqrt{12}$ ” in assnmt 2: 3 marks are added to everyone’s grade. Thus, those who did calculate  $\sqrt{12}$  get 3 bonus marks.

### Tuesday, October 13

Answers to assnmt 2 are posted. By mistake, page 11 got to the end, instead of after page 10.

**Wednesday, October 7, 2009**

Assignment 4 is posted (at long last ...)

**September 24, 2009**

Assignment 3 is posted

**September 21, 2009**

A typo in problem [1] of assnmt 2 has been corrected in the posting: there is no 12; it should be 11.

**September 13, 2009**

Assignment 2 is posted.

**September 5, 2009**

The office hours have been modified. The Friday one has been canceled, and a Tuesday 10:30 to 12:00 added. See also the corrected info sheet.