

Math 3010 (Fall 2009) Assignment 3

Work out and turn in:

1. From the definition of golden ratio: divide a line segment into two parts so that the ratio of the smaller to larger part is equal to the ratio of the larger part to the whole segment, compute the value of this ratio.
2. Show how to eliminate the x^2 term from a cubic polynomial by a linear change of variables. That is, find a conversion $y=x+t$ that changes x^3+ax^2+bx+c to y^3+uy+v .
3. Al-Khwarizmi's method of completing the square depends on signs. We saw his case $x^2+bx=c$ in class (where b and c were positive). Find pictures to illustrate completing the square for the cases:
 - a. $x^2+c=bx$
 - b. $x^2=bx+c$

Note: Help is on p. 273 of the book for part a., or on p. 318 #2 for part b.

Project 1:

You will prepare a lesson to teach to middle school or high school students which incorporates a historical mathematical method. The lesson should take under half an hour (you will get 10 minutes to give an overview in class). Topics will be assigned in class. The possible topics are:

1. Number systems - their arithmetic and algebra
2. Visual solutions to quadratic equations
3. Estimation and use of π
4. Pythagorean theorem
5. Trigonometry - on a sphere, or with chords.

What you need to turn in: a copy of some sort of consumable for the student, e.g. a worksheet, and an approximately 5 page (or more) reflection answering:

1. What grade level (or course) is the most appropriate for?
2. How could this assignment be integrated into existing course material?
3. What is the historical background?
4. How would this assignment reinforce understanding of course material.
5. What do you think could go wrong in the presentation? What mistakes are you ready to head off?

You will get 10-15 minutes each to run your presentation by the class. The other students will rate various aspects of your work anonymously, and you will be able to use this feedback to improve your activity. Please turn in this assignment by 10/28. I would also appreciate the materials emailed to me at opstall@math.utah.edu in PDF format, so the lessons can be shared with others in the class for their use.