

Name: \_\_\_\_\_

**Math 570 - Final exam**

Friday, May 12, 2006

You are permitted a calculator and one  $8\frac{1}{2}$ "  $\times$  11" sheet of paper with handwritten notes. You **must** show all your work on mathematical problems to receive full credit. Questions which ask for answers in paragraph form will be graded on both content and clarity.

Pledge:

On my honor, as a student, I have neither given nor received unauthorized aid on this examination:

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**Historical technique section:** (10 points each)

1. Solve the following quadratic using the picture and technique that al-Khowarizmi would have used:

$$x^2 + 6x = 27.$$

2. Use one of the methods of chessboard multiplication (other than our standard algorithm) found in the *Treviso Arithmetic* to find  $367 \times 825$ . Check your answer by casting out nines.

3. Use the methods of Archimedes to find an approximation for  $\sqrt{7}$ . If you use  $a = 3$  and  $b = 2$  you will only receive partial credit; for full credit use larger values, as we did with  $\sqrt{3}$  using  $a = 26$  and  $b = 1$ .

4. Three men find a purse containing 8 denarii. The first man says to the second, "If I take the money in this purse, I will have twice as much money as you." The second man says to the third, "If I take the money in this purse, I will have three times as much money as you." The third man says to the other two, "If I take the money in this purse, I will have the same amount of money as both of you together." How much money does each man have before finding the purse?

5. Find a root of the cubic equation

$$x^3 - 6x^2 - 6x - 7 = 0$$

using Cardano's method.

6. Find the first five terms of the binomial series expansion of  $(x + 1)^{-3}$ .





13. Describe one major mathematical idea in the *Liber Abaci* that would have been new to European mathematicians of the time.

14. Describe one major mathematical development that took place after the development of calculus.

**Essay questions:** (10 points each)

15. We've seen several examples throughout history of the overlap between algebra and geometry. Choose one example and explain how both algebra and geometry appeared in this instance.

16. Explain some of the main ideas of calculus. You may wish to include motivating questions, the individuals who contributed to its development, or the major unifying ideas. You may find it helpful to draw pictures, but explanations should still be in paragraph form.