MA 350 Dr. G. Stoudt
Eleventh Reading Assignment

Readings

- Chapter V (The Medieval-Renaissance-Reformation Periods in Europe) Introduction, page 243
- Biography of Leonardo of Pisa, page 250
- Reading 53: From *Liber abbaci* (The Rabbit Problem)-Leonardo of Pisa
- Reading 7.A1, Leonardo Fibonacci, pages 241-243 of *The History of Mathematics: A Reader*, ed. John Fauvel and Jeremy Gray
- Biography of Oresme, page 253
- Reading 54: From *De configurationibus* (The Latitude of Forms)-Nicole Orseme
- Reading 55: From *Questiones super geometriam Euclidis* (The Latitude of Forms)-Nicole Oresme

Notes for the Readings

The Fibonnaci sequence is well known with many interesting properties. Reading 53 has its origin.

Elements Proposition VI. 4: In equiangular triangles the sides about the equal angles are proportional, and those are corresponding sides which subtend the equal angles.

Questions for Discussion

Reading 7.A1

1. Compare the second method of solution of the “Tree problem” to the excess and deficiency method of reading 49. What is the key idea?

2. Consider the second method of solution of the “Tree problem.” Let a be the guess (instead of 12). Now write out the solution using a.

3. Problems like “The lion, the leopard, and the bear” are prevalent in modern elementary algebra books. Find such a problem with a solution, copy it, and bring it to class so we can compare the method of solution with that of Leonardo.

Reading 54

1. In the discussion of a quality “uniformly difform which is terminated at no degree,” do you see how one could get the notion of slope?

2. What about “difformly difform?” How does slope come into play in its description?

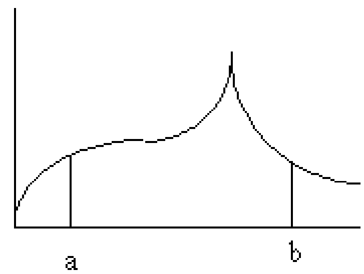
Reading 55

1. The necessity of imagining quantities geometrically gets Oresme in trouble on page 258 (part 3). How can this trouble be eliminated with analytic geometry?

2. The **mean speed rule** is “when a body is uniformly accelerated from rest to some given velocity, it will in that time traverse one-half the distance that it would traverse if, in that time it were moved uniformly at the final velocity . . . for that motion, as a whole, will correspond to precisely one-half that degree which is its terminal velocity.” What does this mean in modern notation and where is this proven in the reading?

3. Make sure you understand “uniform,” “uniformly difform” (terminated at both extremes at some degree, or terminated at no degree), and “difformly difform.”

4. In physics (or calculus), how can one find the distance traveled from time $t = a$ to $t = b$ if the rate of change is given by $f(t)$? What if the rate of change is given by the function whose graph is at right?



Homework Problems

1. From Victor Katz, *A History of Mathematics: An Introduction* (Harper Collins). Solve the following problem of Oresme:
Divide the line *AB* of length 1 proportionally to infinity in a ratio of 2 : 1; that is, divide it so the first part is one-half, the second one-quarter, the third one-eighth, and so on. Let there be a given finite velocity (say, 1) in the first interval, a uniformly accelerated velocity (from 1 to 2) in the second, a constant velocity (2) in the third, a uniformly accelerated velocity (from 2 to 4) in the fourth, and so on. Show that the total distance traveled is 7/4.
Hints: Draw a picture, and use the idea of Question for Discussion number 4.

2. Solve this problem in Leonardo’s *Liber abbaci*:
A merchant doing business in Lucca doubled his money there and then spent 12 denarii. On leaving, he wnent to Florence, where he also doubled his money and spent 12 denarii. Returning home to Pisa, he there doubled his money and again spent 12 denarii, nothing remaining. How much did he have in the beginning?