Math 181
Day 13 Notes

Elijah Hantman

Euclid Proof cont.

Geometric formula:

$$a_1 + a_2 + a_3 + ... + a_n = a_1 \frac{r^{n+1} - 1}{r - 1}$$

This implied Euclid's identity which is formulated:

$$\frac{a_2 - a_1}{a_1} = \frac{a_{n+1} - a_1}{a_1 + a_2 + a_3 + ...a_n}$$

How to prove?

1. Use induction

   Not super interesting.

   $$\sum^{n} a_i = \sum^{n-1} a_i + a_{n-1} r$$

2. Set the sum equal to a variable, multiply by r and solve.

   $$y = a_1 + a_2 + a_3 + ...a_n$$

   $$y * r = a_2 + a_3 + a_4 + ...a_{n+1} \tag{1}$$
   $$y * r - y = a_{n+1} - a_1 \tag{2}$$
   $$y(r - 1) = a_{n+1} - a_1 \tag{3}$$
   $$y = \frac{a_{n+1} - a_1}{r - 1} \tag{4}$$
   $$y = a_1 \frac{r^{n+1} - 1}{r - 1} \tag{5}$$

Does Euclid's Proof Work?

Does he use proof by induction?

Given: A, BC, D, EF

They are each part of a geometric series. $BC = A * r$, etc.

These corrospond to a_1, a_2, a_3, a_4