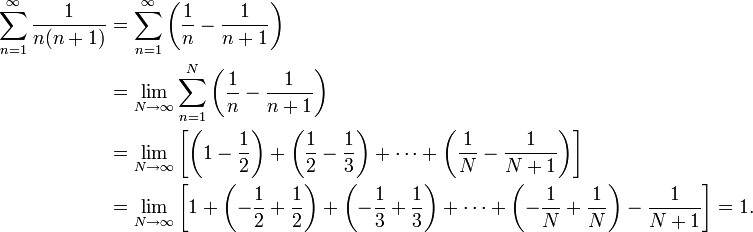
***Telescoping Sum* – Partial Fractions**

For example, the series

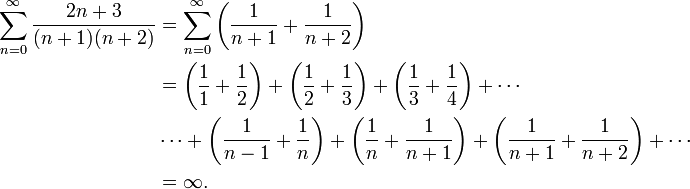


simplifies as

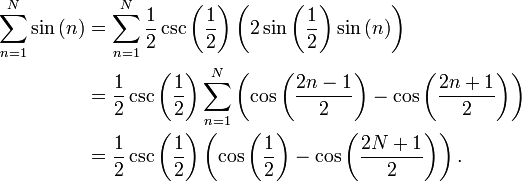


Not all sums that can be split into partial fractions will cancel, however.

For example:



Challenge Problem:



*Hint: Sum to Product Formula*

***Polynomials***

Basic Ideas

* Remainders
  + When we divide f(x) by (x-a), the remainder is a
  + Given f(x) and given g(x), there exist unique p(x) and q(x) such that f(x)=p(x)g(x)+q(x)
* Roots
  + Rational Root Theorem: If f(p/q)=0, that is, p/q is a root where p and q are integers, then p must be divisible by the coefficient of the constant, and q must be divisible by the leading coefficient.
  + Vieta’s formulas: Given a polynomial of degree n,



The sum of the roots is equal to –an-1/an, the pairwise sum of the roots is equal to an-2/an, so on and so forth until the product of all the roots is equal to (-1)n a0.

*Exercises*