Exercises

E16.43 [1FR] Prerequisites: [1BR]. Note: *From an idea in Apostol's book [?], Chapter 7.3.* Write Taylor's polynomial (around $x_0 = 0$) for $-\log(1-x)$, integrating

$$\frac{1}{(1-x)} = 1 + x + x^2 + ... + x^{n-1} + \frac{x^n}{(1-x)} \qquad (16.44)$$

and compare the "remainder"

$$\int_0^x \frac{t^n}{(1-t)} \, dt \qquad (16.45)$$

thus obtained with with the "integral remainder" of $f(x) = -\log(1-x)$ (as presented in Exercise [1BR]).

Proceed similarly for $\arctan(x)$, integrating

$$1/(1+x^2) = 1 - x^2 + x^4 + ... + (-1)^n x^{2n} - (-1)^n x^{2n+2}/(1+x^2) \quad .$$
$$(16.46)$$

Solution 1. [1FS]