Thomas J Osler* (osler@rowan.edu). A heuristic derivation of the Boole summation formula.

In the paper [1], the Gregory-Leibniz series for Pi/2 was shown to exhibit a remarkable feature. The sum to 500,000 terms exhibits an error as early as the sixth decimal place as expected by the alternating series test. However, the next ten decimal places are correct! And there is more of the same astonishing behavior. In the paper [1], every digit for Pi/2 is correct except those underlined. Below these underlined digits is the amount that must be added to make the number correct. (These numbers, 1, -1, 5, -61, . . . , are a special sequence known as Euler numbers.) It is the purpose of this short note to give a heuristic derivation of the Boole summation formula which uses Euler numbers and explains the above remarkable feature. [1] Borwein, J. M., Borwein, P. B., Dilcher, K., Pi, Euler Numbers, and Asymptotic Expansions, The American Mathematical Monthly, 96 (1989), pp. 681-687. (Received September 17, 2019)