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J. B. QUÆSTIONES NONNULLAE DE USURIS, CUM SOLUTIONE PROBLEMATIS DE SORTE ALEARUM

PROPOSED IN *JOURNAL DE SÇAVANS 1685, ART. 25.*

. . . Again by occasion of this infinite series I am called to mind that of the lot of gamblers, which I proposed in the *Journal des Sçavans 1685* article 25 in this manner: Two gamblers A & B play a die, the same condition, when who the first will cast that assigned number of points, wins: A in first place makes one cast, & B one, then A two consecutive casts, & B two: hence A three, & B three, &c. Or, A makes one cast, then B two, hence A three, afterwards B four, &c. until when either of them win. The ratio of the lots is demanded? Since the problem awaited solution thus far in vain, thus I present the same through infinite series: the lot of gambler A to the lot of gamber B in the first case have to one another, as

$$1+\left(\frac{5}{6}\right)^2+\left(\frac{5}{6}\right)^6+\left(\frac{5}{6}\right)^{12}+\left(\frac{5}{6}\right)^{20}\text{ \&c. }-\frac{5}{6}-\left(\frac{5}{6}\right)^4-\left(\frac{5}{6}\right)^9-\left(\frac{5}{6}\right)^{16}\text{ \&c.}$$

in regard to the latter, as

$$1+\left(\frac{5}{6}\right)^3+\left(\frac{5}{6}\right)^{10}+\left(\frac{5}{6}\right)^{21}+\left(\frac{5}{6}\right)^{36}\text{ \&c. }-\left(\frac{5}{6}\right)-\left(\frac{5}{6}\right)^6-\left(\frac{5}{6}\right)^{16}-\left(\frac{5}{6}\right)^{28}\text{ \&c.}$$

to the complement of unity.[1] Of these series the limits represent just as many powers of the fraction $\frac{5}{6}$, of which the indices arise by preserving the differences between themselves in arithmetic progression, of which in that place are two common excesses, here four.

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[1]Several questions on interest, together with the solution to a problem of a chance lot.

Date: *Acta Eruditorum* 1690 (May), p. 219–223.

Translated by Richard J. Pulskamp, Department of Mathematics and Computer Science, Xavier University, Cincinnati OH. August 16, 2009.

[1]The value of the first series is approximately 0.596791943 and that of the second 0.5239191276.