Letter from Newton to John Collins, dated 6 February 1669/70

Author: Isaac Newton

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Trinity College Feb 6 1669.
Cambridge.

Sir

Mr Barrow shewed mee some of your papers in which I was much pleased at Monsieur Cassinis invention for finding the Apogœa & excentricitys of the Planets

For your Annuity Problem I have sent you the following solution to consider of what use it may bee. To know at what rate (N per cent) an Annuity of B is purchased for 31 yeares at the price A. The rule is $\frac{6 \ \text{Log : of } \left(\frac{31\text{B}}{\text{A}}\right)}{100-50 \ \text{Log of } \left(\frac{31\text{B}}{\text{A}}\right)} = \text{Log : of } \left(\frac{100+\text{N}}{100}\right)$.

As for example if $1200^{\bar{\text{li}}}$ bee payd at present for $100^{\bar{\text{li}}}$ yearely for 31 yeares then is the Logarithm of $\left(\frac{31\text{B}}{\text{A}}\right) = 0{,}41218$. And consequently by the rule $\frac{2{,}47308}{79{,}39100}$ or 0,03111 is the Logarithme of $\frac{100+\text{N}}{100}$; whence $\frac{100+\text{N}}{100} = 1{,}0743$. And $\text{N} = 7{,}43$ or $7^{\bar{\text{li}}}$, 8^{s}, 7^{d}. Soe that the Annuity was bought at the rate of $7^{\overline{\text{lib}}}$. 8^{s}, 7^{d} per cent.

This rule is not exact but yet soe exact as never to faile above 2^{d} or 3^{d} at the most when the rate is not above 16^{lib} per cent. And if the rate bee above 16 or $18^{\overline{\text{lib}}}$ per cent, or which is all one if A $\overline{\underline{\ \ |}}$ 6B, then this rule $\frac{\text{A}+\text{B}}{\text{A}} = \frac{100+\text{N}}{100}$ will not err above 2^{s}. You may try the truth of these rules by the equation $\text{x}^{32} = \frac{\text{A}+\text{B}}{\text{A}}\text{x}^{31} - \frac{\text{B}}{\text{A}}$; putting $\frac{100+\text{N}}{100} = \text{x}$, & working in logarithms.

You seeme to apprehend as if I was about writing elaborate Notes upon Kinck-huyson: I understood from M$^{\text{r}}$ Barrow that your desire was only to have the booke reveived: that if any thing were defective or amisse it might be amended, & to that purpose about two Months since I reveived it & made some such observations upon it . But though the booke bee a good introduction I think it not worth the paines of a formall comment, There being nothing new or notable in it which is not to bee found in other Authors of better esteeme.

You make mention of another book of the same Author translated badly into latten by a German Gunner; which you would have mee correct. I understand not Dutch & would not willingly doe the Author soe much wrong as to undertake to correct a translation where I understand not the originall: I suppose there want not Mathematitians in London that understand Dutch.

In finding the Aggregate of the termes of a Musicall Progression there is one way by Logarithms very obvious (viz by subducting the logarithms of each denominator from that of the Numerator &c) which I

supposed to bee the ordinary way in Practise & therefore mentioned it not in my Letter. If you meane another way I would bee glad to have it communicated. Thus Sr I am

Your troublesome Freind & Servant

Isaac Newton.

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M^{r} Newtons Solutio of the Interest Probleme

These

To M^{r} John Collins
at his house in Bloomsbury
next doore to the three
Crownes in

London