APPENDIX.

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t an annual ed on payuivalent to (9) A farm is let for n years at a fixed rent and a fine of \$p. When p years of the lease remain, what fine must be paid to extend these p years to q, at compound interest?

(10) If two joint proprietors have an equal interest in a freehold estate worth a per annum, but one of them purchased the whole to himself by allowing the other an equivalent annuity of b for n years, find the relation between a and b.

(11) Find the present value of an annuity of \$1, paid n times per annum, and continuing for m years, allowing compound interest at the rate of q per cent. per annum; and prove that, as n is indefinitely increased, this present

value continually approaches the limit $\frac{1-e^{-mq}}{2}$.

(12) A monthly instalment of \$10 has 2 years 1 month to run, what sums must be paid at once to reduce the period six months, money being worth one-half per cent. per month?

(13) A mortgage of \$4000, interest at 5 per cent. per annum, payable half-yearly, has 17 years and 8 months to run. Find its present value, interest 10 per cent. per annum, payable half-yearly.

(14) If two sums, s_1 , s_2 , due at times t_1 , t_2 , be paid together at an intermediate time t, t being determined from the equation

$$s_1 \mathbf{R}^{-t_1} + s_2 \mathbf{R}^{-t_2} = (s_1 + s_2) \mathbf{R}^{-t}.$$

Show that whichever mode of payment be adopted

(1) At any antecedent period, the present values are the same;

(2) At any subsequent period, the amounts are the same ;

(3) At the intermediate time of payment, the interest of the sum overdue is the discount of that not due.