(12) $30 \times \log. r =$ ·8356790 $\log. V = 6$·   annuity $= \$65,051.44$

$\qquad r^{30} = 4.32194$ $\log. t =$ ·6969700   interest $=\ \ 50.000$

$\qquad r^{30} - 1 = 3.32194$ $\log. r^{30} =$ ·6356790   sinking fund $=\ \ 15,051.44$

$\log. (r^{30} - 1) =$ ·5213918 $C^1\log.(r^{30} - 1) = \overline{1}\cdot4766082$

$\qquad\qquad\qquad\qquad\qquad \log. a = 4\cdot8132572$ 30 debentures, as a whole

$\qquad\qquad a$ (mean annuity) $= \$65.051.44$ number must be used.

Therefore, the Corporation will have paid for the 1st and 2nd half-

years' interest . . . . $= \$50.000$

and for redemption of 30 Debentures 15.000

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ Total, ... $\$65.000$

At the end of the 2nd year, mean annuity . . . . $= \$65.051.44$

Interest on 1,970 Debentures $= \$985,000$ . . . . $=\ \ 49,250$

$\qquad\qquad\qquad$ Left for Sinking Fund . . . . . . $\$15.801.44$

This would redeem 31 more Debentures, which brings their number
down to 1,939, and the Corporation would have paid for the
2nd year, interest on 1.970 Debentures . . . . $= \$49.250$

and for redemption of 31 more . . . . $=\ \ 15.500$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \$64,750$

at the end of the 3rd year, mean annuity . . . . $= \$65,051.44$

interest on 1,939 Debentures $= \$969,500$ . . . . $=\ \ 48,475$

$\qquad\qquad\qquad$ Left for Sinking Fund . . . . . . $\$16,576.44$ which

would redeem 33 Debentures.   And so on for the balance of the time.   For the
number of Debentures redeemed in the 20th year, take the present value of the
last instalment at that date and divide by 500.

(2) $\log. a = 4\cdot8132572$

$\qquad \log. r^{10} =$ ·2118930

$\qquad \log S = 4\cdot6013642$; $S = \$39,935.96$ or nearly 80 Debentures.

13 It may be mentioned that the sums paid for the Sinking Fund are in a geo-
metrical progression, similar to the progression of \$1 principal invested at the
same rate of interest.

It often happens that Corporations or Companies, when they make all their
bonds payable at one given date, have to lose at least 1% on the reinvestment
of their Sinking Fund.   It would, therefore, save them the work and risk of re-
investment by making their bonds in the form of annuities, and discounting these
so as to pay the buyer the given rate of interest; or otherwise, when the bonds
are made to bear a given rate of interest, and all payable at the same time, they
might bear an agreement that the Sinking Fund, or excess over interest, of the
annual assessment for redemption of the whole issue should be used to redeem
bonds to the amount of the sum which remains after paying the interest for each
year on the balances remaining unpaid.   This mode of payment has been
adopted by various Companies, and the bonds to be redeemed are usually chosen
by lot, and, as compensation for terminating the investment, some distribute
prizes, and others an additional percentage, to those whose bonds are called in
during the first few years.   As the amounts applicable to redemption are rela-
tively very small during the first years' of bonds running a long period, the cost
of an additional ½% or 1% would not amount to one-tenth of the loss usually
incurred in reinvesting the Sinking Fund.