

Doubling Your Money in a Given Amount of Time

Problem: Given that there are N compounding periods per year, what is the p.a. interest rate that will double your money in a term consisting of n periods?

Solution: Let r be the required p.a. interest rate. Then, using the compound interest formula, we have

$$P \left(1 + \frac{r}{N}\right)^n = 2P.$$

Then $\left(1 + \frac{r}{N}\right)^n = 2.$

Then $\log \left(\left(1 + \frac{r}{N}\right)^n \right) = \log(2).$

Then $n \log \left(1 + \frac{r}{N}\right) = \log(2).$

Then $\log \left(1 + \frac{r}{N}\right) = \frac{\log(2)}{n}.$

Then $\exp \left(\log \left(1 + \frac{r}{N}\right) \right) = \exp \left(\frac{\log(2)}{n} \right).$

Then $1 + \frac{r}{N} = \exp \left(\frac{\log(2)}{n} \right).$

Then $\frac{r}{N} = \exp \left(\frac{\log(2)}{n} \right) - 1.$

Then $r = N \left(\exp \left(\frac{\log(2)}{n} \right) - 1 \right).$

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