Thurs_04_21

Thursday, April 21, 2022 2:37 PM

Unfinished Business from last time

Effective annual yield

$$Y = \left(1 + \frac{r}{n}\right)^n - 1$$

r = nominal rate

n = # of compounding

Hw

1. Solve the effective annual yield formula for r
2. Ridgeway Savings compound interest monthly. The effective annual yield is 1.95%. What is the nominal rate (r)

(1)

$$r = n\left[(Y+1)^{1/n} - 1\right]$$

(2)

$n = 12$, $Y = 1.95\% = 0.0195$

$$r = 12\left[(0.0195+1)^{1/12} - 1\right]$$

$$= 12\left[1.0195^{1/12} - 1\right]$$

$$= 0.0193$$

nominal rate is 1.93%

Year to double

given a principal, compounded continuously, how long will it take to double the principal?

$$A = Pe^{rt} \qquad (A = 2P)$$

$$2P = Pe^{rt}$$

$$2 = e^{rt}$$

(we take $\log_e$ of both sides, this is the natural log ln of both sides

$$\ln 2 = \ln e^{rt}$$

$$\ln 2 = (rt)\ln e$$

$$\ln 2 = rt$$

$$\frac{\ln 2}{r} = t$$

$$\frac{100 \ln 2}{100 r} = t$$

$$\frac{70}{100r} \approx t \qquad \left(\text{Rule of } 70\right)$$

Exercise

use the rule of 70 to estimate the years to double for each annual inflation rate

$r = 1\%$

$$\text{years to double} \approx \frac{70}{\text{annual inflation rate}} \approx \frac{70}{1} = 70 \text{ years}$$

HW

Derive a rule for estimating the years to triple

$3P = Pe^{rt}$ (solve for t)

Inflation proportion

$$\frac{\text{price in year A}}{\text{price in year B}} = \frac{\text{CPI in year A}}{\text{CPI in year B}}$$

13.2 Consumer Credit

Exercise

1. Neema bought appliances costing $3795 at a store charging 6% add-on interest. She made a $1000 down payment and agreed to monthly payment over 2 years

(a) Find the total amount to be financed

$$\text{Total amt financed} = \text{purchase amt} - \text{down payment}$$
$$= \$3795 - \$1000$$
$$= \$2795$$

(b) Find the total interest to be paid

$$I = P \cdot r \cdot t$$
$$I = (2795) \cdot (0.06) \cdot (2)$$
$$= \$335.4$$

(c) Find the total amt to be repaid

$$A = P + I$$
$$= \$2795 + \$335.4$$
$$= \$3130.40$$

(d) what is the monthly payment

$$= \frac{\$3130.4}{24} = \$130.43$$

(e) Find the total cost for appliances + interest

$\$3130.40 + \$1000 = \$4130.40$

(f) what percent of original price tag total did the financing cost

$$\frac{4130.40 - 3795}{3795} \approx 0.088$$

9%

$$\frac{4130.40 - 3795}{3795} \approx 0.088$$

9%

13.4 The cost and advantages of home ownership

Regular monthly Payment

Approach 1 – Formula

$$R = \frac{P \cdot \left(\frac{r}{12}\right)}{1 - \left(\frac{12}{12+r}\right)^{12t}}$$

r = annual interest rate

P = principal

t = time in years

Approach 2 TVM Solver