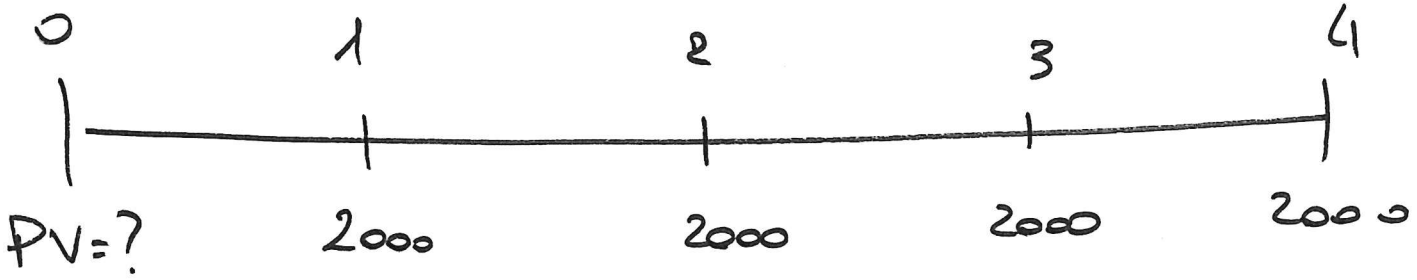
FRIDAY, 30TH September 2022

SUPPOSE THAT YOU WILL GET € 2,000 EVERY YEAR FOR 4 YEARS.
WHAT IS THE PRESENT VALUE OF THESE CASH FLOWS IF $(i; k; \pi) = 5\%$



$$PV = \frac{2000}{1.05} + \frac{2000}{(1.05)^2} + \frac{2000}{(1.05)^3} + \frac{2000}{(1.05)^4}$$

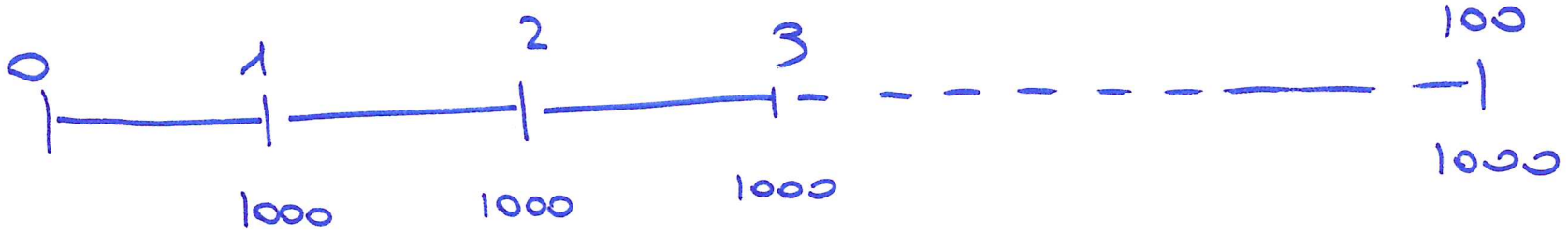
$$PV = 2000\left[\frac{1}{1+\pi} + \frac{1}{(1+\pi)^2} + \frac{1}{(1+\pi)^3} + \frac{1}{(1+\pi)^4}\right]$$

$$PV = V_0 = C \cdot \underbrace{ADF}_{\text{ANNUITY DISCOUNT FACTOR}}(\pi; n) \Rightarrow \left[\frac{1 - \frac{1}{(1+k)^n}}{\pi}\right]$$

$$PV = V_0 = 2000 \cdot \left[\frac{1 - \frac{1}{(1.05)^4}}{0.05} \right] = 7,091.90 €$$

$$PV = V_0 = \frac{2000}{0.05} \cdot \left(1 - \frac{1}{(1.05)^4} \right) = 7,091.90 €$$

WHAT IS THE PV OF €1,000 PAID AT THE END OF EACH OF THE NEXT 100 YEARS IF THE $\{i; n; k\} = 7\%$ PER YEAR?



$$PV = \frac{1,000}{0.07} \cdot \left(1 - \frac{1}{(1.07)^{100}} \right) = 14,269.25 €$$

CALCULATE THE F.V. OF 2,000 € IN

Ⓐ → 5 YEARS i ; 5% per year F.V. ~~2,000~~ $2{,}000(1.05)^{5} = 2{,}552.56$

Ⓑ → 10 YEARS i = 5% per year F.V. $2{,}000(1.05)^{10} = 3{,}254.79$ €

Ⓒ → FIVE YEARS i = 10% per year F.V. $2000\left(\frac{1.10}{1.00}\right)^{5} = 3{,}221.02$

WHY IS THE AMOUNT OF INTEREST EARNED IN POINT Ⓐ LESS THAN HALF THE AMOUNT OF INTEREST EARNED IN POINT Ⓑ.

BECAUSE,

CONSIDER THE FOLLOWING ALTERNATIVES:

α: 100€ RECEIVED IN ONE YEAR

β: 200€ RECEIVED IN FIVE YEARS

γ: 300€ RECEIVED IN TEN YEARS

① -> RANK THE ALTERNATIVES FROM MOST VALUABLE TO LEAST VALUABLE IF $i = 10\%$ PER YEAR.

	AMOUNT	YEARS	PV
α	100	1	90.91
β	200	5	124.18
γ	300	10	115.56

$\beta > \gamma > \alpha$

② -> - - - - - IF $i = 5\%$ PER YEAR

α	95.24
β	156.71
γ	184.17

$\gamma > \beta > \alpha$

③ -> - - - - - IF $i = 20\%$ PER YEAR

α	83.33
β	80.38
γ	49.15

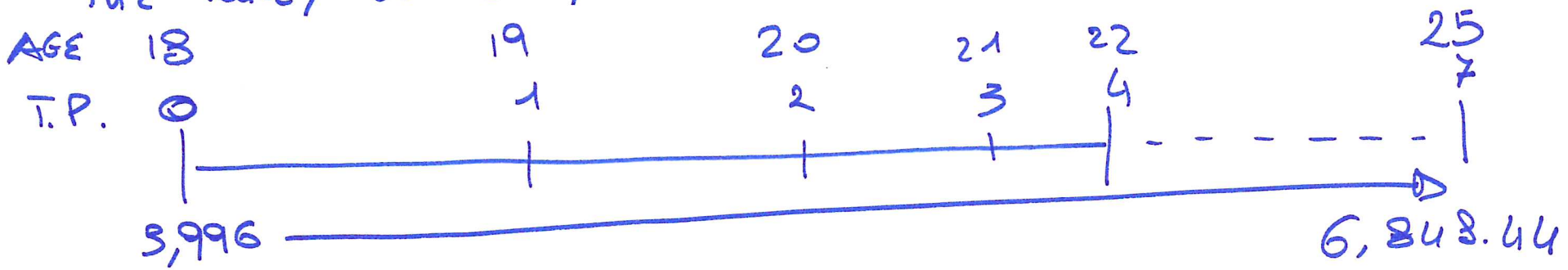
$\alpha > \beta > \gamma$

YOUR GRANDFATHER PUT SOME MONEY IN AN ACCOUNT FOR YOU ON THE DAY YOU WERE BORN.

YOU ARE NOW 18 YEARS OLD AND ARE ALLOWED TO WITHDRAW THE MONEY FOR THE FIRST TIME.

THE ACCOUNT CURRENTLY HAS (t=0) 3,996 € IT PAYS AN 8% INTEREST RATE.

(A). HOW MUCH MONEY WOULD BE IN THE ACCOUNT IF YOU LEFT THE MONEY UNTIL YOUR 25TH BIRTHDAY?



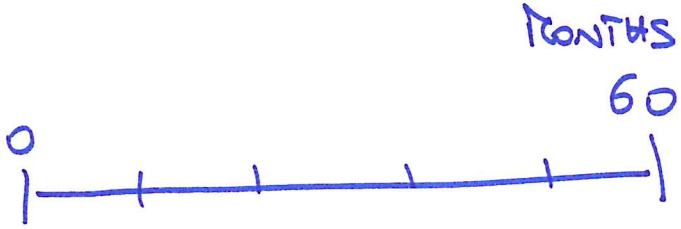
(B) HOW MUCH MONEY DID YOUR GRANDFATHER ORIGINALLY PUT IN THE ACCOUNT? $i = 8\%$.

$$P.V. = \frac{3,996}{(1.08)^{18}} = 1,000 \text{ €}$$

THE PURCHASE PRICE OF THE CAR YOU WOULD LIKE TO BUY IS 37,150 €. YOU WANT TO TAKE OUT A LOAN (100%. FINANCING) WITH A MATURITY OF 60 MONTHS. THE FIRST LOAN PAYMENT WILL COME IN ONE MONTH'S TIME, AND THE INTEREST RATE IS 4% PER YEAR, COMPOUNDED MONTHLY.

WHAT ARE THE MONTHLY CAR PAYMENTS?

$$V_0 = 37,150 = C \cdot ADF(r = ?;\ n = 60)$$



$$r = \frac{4\%}{12} = 0.33\%$$

$$C = \frac{37,150}{\dfrac{1 - \dfrac{1}{(1.0033)^{60}}}{0.0033}} = 683.5\ €$$

$i = 4\%$ per year COMPOUNDED MONTHLY

LET'S CALCULATE OTHER EFFECTIVE RATES $\left(\frac{r}{m}\right)$

1. EFFECTIVE 2-MONTH RATE : $i_2 = (1 + 0.0033)^2 - 1 = 0.6611\%$

2. " 3-MONTH RATE : $1 + \frac{4\%}{12}$ $i_3 = (1.0033)^3 - 1 = 0.9933\%$

3. " 6-MONTH RATE : $i_6 = (1.0033)^6 - 1 = 0.0199$ ~~1.9964~~ 1.9964%

4. " 18-MONTHY RATE : $i_{18} = (1.0033)^{18} - 1 = 6.1096\%$