

PFDS: FINAL EXAM -- TERM ONE (QUESTION 1)

Question 1:

Write a program that uses the formula given below to do the following:

$$M = P \cdot \left[i \div \left(1 - \left\{ \frac{1}{(1+i)^{12t}} \right\} \right) \right]$$

a. Asks the user for the following information:

- the size of their personal loan (P)
- the annual interest rate (r) they will have to pay for their personal loan
- the term of their loan in years (t)

b. Calculates the following:

- the monthly payment (M) needed to pay back the loan
- the total amount paid over the term of the loan
- the amount of interest paid over the term of the loan

c. Prints out an amortization table (see the example below).

- Use the following test case: You take out a personal loan for \$1500 to buy a mountain bike at an annual interest rate of 10% for a term of 2 years.

Month	Beginning Balance	Monthly Payment	Interest	Principal	Ending Balance
1	1500.00	69.22	12.50	56.72	1443.28
2	1443.28	69.22	12.03	57.19	1386.09
3	1386.09	69.22	11.55	57.67	1328.42
4	1328.42	69.22	11.07	58.15	1270.27
5	1270.27	69.22	10.59	58.63	1211.63
6	1211.63	69.22	10.10	59.12	1152.51
7	1152.51	69.22	9.60	59.62	1092.89
8	1092.89	69.22	9.11	60.11	1032.78
9	1032.78	69.22	8.61	60.61	972.17
10	972.17	69.22	8.10	61.12	911.05
11	911.05	69.22	7.59	61.63	849.42
12	849.42	69.22	7.08	62.14	787.28
13	787.28	69.22	6.56	62.66	724.62
14	724.62	69.22	6.04	63.18	661.44
15	661.44	69.22	5.51	63.71	597.73
16	597.73	69.22	4.98	64.24	533.49
17	533.49	69.22	4.45	64.77	468.72
18	468.72	69.22	3.91	65.31	403.41
19	403.41	69.22	3.36	65.86	337.55
20	337.55	69.22	2.81	66.41	271.14
21	271.14	69.22	2.26	66.96	204.18
22	204.18	69.22	1.70	67.52	136.66
23	136.66	69.22	1.14	68.08	68.58
24	68.58	69.15	0.57	68.58	0.00

d. Note 1: Make sure that your program is general enough to work for other test cases.

e. Note 2: Pay special attention to the last payment amount which may have to be adjusted to make sure that the final balance gets zeroed out.

f. Note 3: Feel free to take whatever steps possible to see that your output looks aesthetic and professional.

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In [66]: P = int(input("How much is your loan amount: "))
r = float(input("How much is the annual interest rate: "))
t = int(input("How long is the loan for, in terms of years: "))
print("\n")
i = r/12
def calc_monthly_payment(P, i, t):
    return P * ( (i / (1 - (1/((1+i)**(12*t))))) )

monthly_payment = round(calc_monthly_payment(P, i, t),2)
month_end = t*12+1
print(f"{'Month':<8}{'Principal':<12}{'Monthly Payment':<18}{'Interest':<12}{'Principal'")
for month in range(1,month_end):
    interest = round((P * i), 2)
    principal = round((monthly_payment-interest),2)
    ending_bal = round((P - principal),2)
    if monthly_payment > (P + interest):
        monthly_payment = round((P + interest),2)
        ending_bal = 0
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```
print(f"month:<8}{P:<12}{monthly_payment:<18}{interest:<12}{principal:<12}{ending_bal  
P = ending_bal
```

How much is your loan amount: 1500

How much is the annual interest rate: 0.1

How long is the loan for, in terms of years: 2

Month	Principal	Monthly Payment	Interest	Principal	Ending Balance
1	1500	69.22	12.5	56.72	1443.28
2	1443.28	69.22	12.03	57.19	1386.09
3	1386.09	69.22	11.55	57.67	1328.42
4	1328.42	69.22	11.07	58.15	1270.27
5	1270.27	69.22	10.59	58.63	1211.64
6	1211.64	69.22	10.1	59.12	1152.52
7	1152.52	69.22	9.6	59.62	1092.9
8	1092.9	69.22	9.11	60.11	1032.79
9	1032.79	69.22	8.61	60.61	972.18
10	972.18	69.22	8.1	61.12	911.06
11	911.06	69.22	7.59	61.63	849.43
12	849.43	69.22	7.08	62.14	787.29
13	787.29	69.22	6.56	62.66	724.63
14	724.63	69.22	6.04	63.18	661.45
15	661.45	69.22	5.51	63.71	597.74
16	597.74	69.22	4.98	64.24	533.5
17	533.5	69.22	4.45	64.77	468.73
18	468.73	69.22	3.91	65.31	403.42
19	403.42	69.22	3.36	65.86	337.56
20	337.56	69.22	2.81	66.41	271.15
21	271.15	69.22	2.26	66.96	204.19
22	204.19	69.22	1.7	67.52	136.67
23	136.67	69.22	1.14	68.08	68.59
24	68.59	69.16	0.57	68.65	0

In []: