Actuarial Mathematics Homework 9

MORITZ M. KONARSKI

Parmenter Exercises 4–17 to 4–25

4–17. Table:

Duration	Payment	Interest	Principal Repaid	Outstanding Principal
0	-	-	-	5000
1	1285.78748	700.00000	585.78748	4414.21252
2	1285.78748	617.98975	667.79773	3746.41480
3	1285.78748	524.49807	761.28941	2985.12539
4	1285.78748	417.91755	867.86992	2117.25547
5	1285.78748	296.41577	989.37171	1127.88375
6	1285.78748	157.90373	1127.88375	0.00000

4–18. Table:

Duration	Payment	Interest	Principal Repaid	Outstanding Principal
0	-	-	-	50000
1	4537.81977	3250.00000	1287.81977	48712.18023
2	4537.81977	3166.29172	1371.52805	47340.65218
3	4537.81977	3077.14239	1460.67738	45879.97480
4	4537.81977	2982.19836	1555.62141	44324.35340
5	4537.81977	2881.08297	1656.73680	42667.61660
6	4537.81977	2773.39508	1764.42469	40903.19191
7	4537.81977	2658.70747	1879.11229	39024.07962
8	4537.81977	2536.56518	2001.25459	37022.82502
9	4537.81977	2406.48363	2131.33614	34891.48888
10	4537.81977	2267.94678	2269.87299	32621.61589
11	4537.81977	2120.40503	2417.41473	30204.20116
12	4537.81977	1963.27308	2574.54669	27629.65447
13	4537.81977	1795.92754	2741.89223	24887.76224
14	4537.81977	1617.70455	2920.11522	21967.64702
15	4537.81977	1427.89706	3109.92271	18857.72430
16	4537.81977	1225.75208	3312.06769	15545.65662
17	4537.81977	1010.46768	3527.35209	12018.30453
18	4537.81977	781.18979	3756.62997	8261.67455
19	4537.81977	537.00885	4000.81092	4260.86363
20	4537.81977	276.95614	4260.86363	0.00000

Date: October 27, 2020.

4–19. Table:

Duration	Payment	Interest	Principal Repaid	Outstanding Principal
0	-	-	-	2462.09793
1	300.00000	344.69371	-44.69371	2506.79164
2	300.00000	350.95083	-50.95083	2557.74247
3	300.00000	358.08395	-58.08395	2615.82642
4	300.00000	366.21570	-66.21570	2682.04212
5	300.00000	375.48590	-75.48590	2757.52801
6	400.00000	386.05392	13.94608	2743.58193
7	400.00000	384.10147	15.89853	2727.68340
8	400.00000	381.87568	18.12432	2709.55908
9	400.00000	379.33827	20.66173	2688.89735
10	400.00000	376.44563	23.55437	2665.34298
11	400.00000	373.14802	26.85198	2638.49100
12	400.00000	369.38874	30.61126	2607.87974
13	400.00000	365.10316	34.89684	2572.98290
14	600.00000	360.21761	239.78239	2333.20051
15	600.00000	326.64807	273.35193	2059.84858
16	600.00000	288.37880	311.62120	1748.22738
17	600.00000	244.75183	355.24817	1392.97922
18	600.00000	195.01709	404.98291	987.99631
19	600.00000	138.31948	461.68052	526.31579
20	600.00000	73.68421	526.31579	0.00000

4–20. Table:

Duration	Payment	Interest	Principal Repaid	Outstanding Principal
0	-	-	-	2304.4342
1	200.00000	21.12398	178.87602	2125.55818
2	200.00000	19.48428	180.51572	1945.04246
3	200.00000	17.82956	182.17044	1762.87202
4	200.00000	16.15966	183.84034	1579.03168
5	200.00000	14.47446	185.52554	1393.50614
6	200.00000	12.77381	187.22619	1206.27994
7	200.00000	11.05757	188.94243	1017.33751
8	200.00000	9.32559	190.67441	826.66310
9	200.00000	7.57775	192.42225	634.24085
10	200.00000	5.81387	194.18613	440.05472
11	200.00000	4.03383	195.96617	244.08856
12	200.00000	2.23748	197.76252	46.32604
13	46.75069	0.42466	46.32604	0.00000

4–21. I could not solve these problems.

4–22.

```
l = 5000
op = l
```

```
i = 0.14
p = 1285.78747828912

c = 0
print("Dur\tPay\t\tInt\t\tPR\t\tOP")
print("0\t-\t\t-\t\t-\t\t{0}".format(l))

while op >= 0:
    I = i * op
    pr = p - I
    op = op - pr
    c= c + 1
    print("{0}\t{1:.5f}\t\t{2:.5f}\t\t{3:.5f}\t\t{4:.5f}".format(c,p,I,pr,op))
```

4–23. This table has 300 rows so I will not add it here for space reasons.

4–24.

```
l = 2462.09793136526
op = l
i = 0.14

def get_p(c: int) -> float:
    if c < 5:
        return 300
    elif c < 13:
        return 400
    else:
        return 600

c = 0
print("Dur\tPay\t\tInt\t\tPR\t\tOP")
print("0\t-\t\t-\t\t-\t\t{0}".format(l))

while op >= 0:
    I = i * op
    pr = get_p(c) - I
    op = op - pr
    c= c + 1
    print("{0}\t{1:.5f}\t\t{2:.5f}\t\t{3:.5f}\t\t{4:.5f}".format(c,get_p(c-1),
        I,pr,op))
```

4–25.

```
l = 2304.4342
op = l
i = 0.11/12

def get_p(c: int, op: float) -> float:
    if op > 200:
        return 200
    else:
        return op * (1+i)

c = 0
print("Dur\tPay\t\tInt\t\tPR\t\tOP")
print("0\t-\t\t-\t\t-\t\t{0}".format(l))

while op >= 0:
    I = i * op
    pr = get_p(c, op) - I
    op = op - pr
    c= c + 1
    print("{0}\t{1:.5f}\t\t{2:.5f}\t\t{3:.5f}\t\t{4:.5f}".format(c, get_p(c-1,
        op+pr), I, pr,
        op))
```