

EMF
matematyka, I rok, I stopień
lista 7
renty

Zadania z podręcznika Kellisona

1. Find the accumulated value 18 years after the first payment is made of an annuity on which there are 8 payments of \$2000 each made at two years intervals. The nominal rate of interest convertible semiannually is 7%. Answer to the nearest dollar.
2. Find the present value of a ten-years annuity which pays \$400 at the beginning of each quarter for the first 5 years, increasing to \$600 per quarter thereafter. The annual effective rate is 12%. Answer to the nearest dollar.
3. Show that the present value at time 0 of 1 payable at times 7, 11, 15, 19, 23, and 27 is

$$\frac{a_{\overline{28}|} - a_{\overline{4}|}}{s_{\overline{3}|} - a_{\overline{1}|}}.$$

4. A perpetuity of \$750 payable at the end of every year and a perpetuity of \$750 payable at the end of every 20 years are to be replaced by an annuity of R payable at the end of every year for 30 years. If $i^{(2)} = 0,04$, show that

$$R = 37500 \left(\frac{1}{s_{\overline{2}|}} + \frac{v^{40}}{a_{\overline{40}|}} \right) \frac{s_{\overline{2}|}}{a_{\overline{60}|}}.$$

5. Find the expression for the present value of an annuity-due of \$600 per annum payable semiannually for 10 years if $d^{(12)} = 0,09$.
6. The present value of a perpetuity paying 1 at the end of every three years is $\frac{125}{91}$. Find i .
7. Find the expression for the present value of an annuity on which payments are \$100 per quarter for five years, just before the first payment is made, if $\delta = 0,08$.
8. A perpetuity paying 1 at the beginning of each year has a present value of 20. If this perpetuity is exchange for another perpetuity paying R at the beginning of every two years, find R so that the values of the two perpetuities are equal.
9. Derive the following formulas
 - a) $\frac{1}{a_{\overline{n}|}^{(m)}} = \frac{1}{s_{\overline{n}|}^{(m)}} + i^{(m)}$;
 - b) $\frac{1}{\ddot{a}_{\overline{n}|}^{(m)}} = \frac{1}{s_{\overline{n}|}^{(m)}} + d^{(m)}$.
10. A sum of \$10000 is used to buy a deferred perpetuity-due paying \$500 every six months forever. Find an expression for the deferred period expressed as a function of d .
11. Find the expression for the present value of an annuity which pays 1 at the beginning of each 3-month period for 12 years, assuming a rate of interest per 4-month period.

12. Simplify

$$\sum_{t=1}^{20} (t+5)v^t.$$

13. The following payments are made under an annuity: 10 at the end of the fifth year, 9 at the end of the sixth year, decreasing by 1 each year until nothing is paid. Show that the present value is

$$\frac{10 - a_{\overline{14}|} + a_{\overline{4}|}(1 - 10i)}{i}$$

14. A perpetuity-immediate has annual payments of 1, 3, 5, 7, ... If the present value of the sixth and seventh payments are equal, find the present value of the perpetuity.

Zadania ze zbioru zadań Podgórskiej i inne

15. Renta z dołu składa się z 15 rat po 500 zł. Nominalna stopa procentowa z kapitalizacją kwartalną wynosi 12%. Jaka jest wartość końcowa tej renty, jeśli raty są:
- a) miesięczne;
 - b) kwartalne;
 - c) półroczne?
16. Odsetki kapitalizowane są co kwartał przy stopie procentowej $i^{(4)} = 0,08$. Obliczyć wartość początkową renty o 12 ratach po 100 zł płatnych:
- a) na koniec kolejnych kwartałów;
 - b) na początku kolejnych kwartałów;
 - c) na koniec kolejnych kwartałów z odroczeniem o trzy kwartały;
 - d) na koniec kolejnych półroczy;
 - e) na koniec kolejnych miesięcy, przy czym odsetki za podokresy naliczane są zgodnie z zasadą:
 - 1) oprocentowania składanego;
 - 2) oprocentowania prostego.
17. Wartość początkowa renty o 20 ratach tworzących ciąg arytmetyczny o różnicy 50 wynosi 8300. Jeśli $i = 4\%$, ile wynosi pierwsza rata?