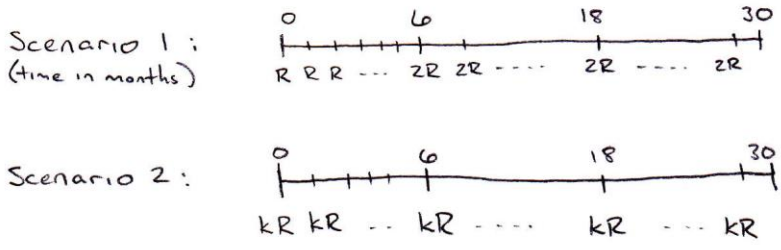
HW 2.2(c) Key

1. A company has a lease expiring on December 31, 2013. The company is notified that the monthly rent will double as of January 1, 2014. This rate will be good for 2 years. The company wishes to dampen the effect of the rent increase by paying a higher rent for 2 1/2 years, starting July 1, 2013.

   Calculate the percentage increase on July 1, 2013 assuming an interest rate of 9.6% compounded monthly. [3.a-c #15]

   [A] 78.04% B) 77.58% C) 78.51% D) 78.98% E) 79.45%



$i^{(12)} = 0.096 \quad j = 0.008$

$R\ddot{a}_{\overline{6}|j} + (2R\ddot{a}_{\overline{24}|j})v_j^6 = kR\ddot{a}_{\overline{30}|j}$

$\ddot{a}_{\overline{6}|j} + 2\ddot{a}_{\overline{24}|j}v_j^6 = k\ddot{a}_{\overline{30}|j}$) ÷ by $(1+j)$

$a_{\overline{6}|j} + 2a_{\overline{24}|j}v_j^6 = ka_{\overline{30}|j}$

$47.3196 = k(26.5776) \rightarrow k = 1.7804$

2. A renter with $5,252 has a one year lease. The landlord is willing to accept two payment options:
   (i) $5,252 now; or
   (ii) $650 paid at the beginning of each month for twelve months.
   What monthly interest rate would be required for the two options to be equivalent? [3.h-i #05]

   [A] At least 8%, but less than 8.5%
   B) At least 7%, but less than 7.5%
   C) At least 7.5%, but less than 8%
   D) At least 8.5%, but less than 9%
   E) At least 9%, but less than 9.5%

$5252 = 650\ddot{a}_{\overline{12}|j}$

$5252 = 650(a_{\overline{11}|j} + 1)$

$4602 = 650\, a_{\overline{11}|j}$

$\boxed{j = 8.1713\%}$ (BA II)

3. A person deposits 1,000 at the beginning of each year for 12 years. Simple interest at an annual rate of i is credited to each deposit from the date of deposit to the end of the 12 year period. The total accumulated amount thus accumulated is 15,900.

If instead, compound interest had been credited at an effective annual rate of i, what would the accumulated value of these deposits have been at the end of 12 years? [3.h-i #13]

[A] 16,710 B) 15,210 C) 15,710 D) 16,210 E) 17,210

Recall: $1+2+3+\ldots+n = \frac{n(n+1)}{2}$

$1000(1+12i) + 1000(1+11i) + 1000(1+10i) + \ldots + 1000(1+i) = 15{,}900$

$1000\left[(1+12i) + (1+11i) + \ldots + (1+i)\right] = 15{,}900$

$12 + (1+2+\ldots+11+12)i = 15.9$

$\frac{12(13)}{2} i = 3.9$

$i = 0.05$

$1000\ddot{s}_{\overline{12}|5\%} = 1000(1.05)s_{\overline{12}|5\%} = \boxed{16{,}712.98}$

4. A loan of \$22,800 is to be repaid within one year with level monthly payments, due at the beginning of each month.

The 12 payments equal \$1,900 each. A finance charge of \$512 is also due with the first payment.

Which of the following is closest to the effective annual interest rate on the loan? [3.h-i #15]

[A] 5.1% B) 5.2% C) 5.3% D) 5.4% E) 5.5%

$22{,}800 = 512 + 1900\,\ddot{a}_{\overline{12}|j}$ (j = monthy rate)

$22{,}288 = 1900\,(a_{\overline{11}|j} + 1)$

$11.7305 = a_{\overline{11}|j} + 1$

$a_{\overline{11}|j} = 10.7305$

$j = 0.4157\% \rightarrow \boxed{i = 5.104\%}$

5. Sam deposits 2000 every year on his birthday into a retirement fund earning an annual effective rate of 10%. The first deposit is made on his 29th birthday, and the last deposit is made on his 54th birthday.

Immediately after the last deposit, the accumulated value of the fund is transferred to a fund earning an annual effective rate of j.

9 years later, a 25-year monthly annuity-due paying 2000 each month is purchased with the funds.

The purchase price of the annuity was determined using a nominal rate of interest convertible monthly at 4.8%.

Calculate j. [3.j #03]

[A] 5.4% B) 4.3% C) 4.6% D) 4.9% E) 5.1%

$$2000\, s_{\overline{26}|10\%}\,(1+j)^9 = 2000\, \ddot{a}_{\overline{300}|0.004}$$

$$j = \boxed{0.05396}$$