Last Update: 5:30pm July 18

2b is incorrect. And hence 2c is incorrect as well

The error in my math is as follow. Take the 37th period, then its present value should be 1K/[(1.01)^36 * (1+r)^1]. For the 38th period, its present value should be 1K/[(1.01)^36 * (1+r)^2], and so on... This is because the interest rate in the first 36 periods is 1% per month, and thus we need to discount the first 36 months by this rate.

Computing the present value by taking the above into consideration, we get n-36 = 180.73 months.

Note: You can also compute the future value of the cash flow at period 36, then discount all cashes in time 37, 38, etc back into time 36. The math should work out to be the same.

(2c) Since (2b) is incorrect, so is (2c).

To correct that, just apply what we discussed above to compute the PV of the cash flow. I got $1980.67 for C.

If you see an error, do let me know.

1) We did this in discussion.

I have for my first cash flow: <0,55K, 55K * (1.02), 55K * (1.02)^2, ...>
Discounting by r = 4% for six-month period, we get $2,750,000 as the PV.

For the second cash flow (1-year periods), I have <0,500K, 200K, 500K, 200K, 500K, 200K, 500K, 200K>
Note that the above is for one-year period, so we have to compute the EAR, which comes out to be 8.16%.
Discounting by 8.16% for yearly period, we get $2,032,754.92 as the PV.

So I should take the first option.

Some of you argued that the 0th period in the first cash flow is July 1, 2009 (going by six-month interval), whereas the 0th period in the second cash flow is Jan 1, 2009. So the PV's represent different things. You are absolutely right!

To correct this, we should multiply PV2 by 1.04, as that will take the value 6-month forward, which gives $2,114,065.12. Now the two "present values" are on the same term. We still prefer the first option to the second.

To check this, you should also try to find the PV of the cash flow <0,500K,0,200K,0,500K,0,200K,0,500K,0,200K,0,500K,0,200K,0> using r = 4%. The present value of this should also be $2,114,065.12. If not, let me know.

2) (a) The cash flow is <4K,0,0,0,0,0,1K,1K,...,1K,1K+8K,1K,...,1K> where the 1K+8K occurs at period 36, and the cash flow is over n periods.

We want PV of the above cash flow equal to 100K. After solving, I got n = 306.478428 months, or about 25 years.

(b) If that happens, then our PV again must be 100K, where PV is computed in this way:

$$4K + 1K/(1.01)^6 + ... + 1K/(1.01)^{36} + 8K/(1.01)^{36} + 1K/(1+r)^{37} + ... + 1K/(1+r)^n = 100K,$$ where $r = 0.833333\%$.

After some algebra, and hopefully no errors, I got n-37 = 158.67023, so that n-36 = 159.67. That's the number of months after the balloon payment that I have to continue making the monthly payment.

(c) The cash flow looks like <4K,0,...,0,1K,...,1K,1K+8K,C,C,...,C>

$$PV = 4K + 1K/(1.01)^6 + ... + 1K/(1.01)^{36} + 8K/(1.01)^{36} + C/(1+r)^{37} + ... + C/(1+r)^{96} = 100K,$$ where $r = 0.8333\%$.

Again, simplify this, and after some algebra, I got C = \$1866.3435

3) (a) true
(b) false
(c) true
(d) true
(e) false (if you don't like the example where r = 0%, you can take n=2, C=100,r=1%,F=1000, I think this is also a counterexample).