1. (35 p) What value of $A$ makes the two annual cash flows equivalent at 13% interest compounded monthly?

![Diagram of annual cash flows]

2. (35 p) Find the value of $x$ below such that the positive cash flows will be exactly equivalent to the negative cash flows, if the interest rate is 14% compounded yearly.

![Diagram of cash flows]

3. (30 p) A SME company is considering buying an equipment for $300,000. If it makes a down payment of $100,000 and takes out a credit on the rest of the loan at 9% compounded monthly, what will be its monthly payment to pay it off in 5 years?
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1. Given: \( r = 13\% \) compounded monthly, \( K = 1 \)
\( N = 5 \) years
Find: Equivalent annual deposit amount (\( A \)) of the second cash flow for the same \( F \) or \( P \) value with the 1\textsuperscript{st} cash flow.

**First cash flow:**
\[ i_p \] should be determined according to the payment period of the first cash flow by considering compounding monthly:
\[ K = 1, M = 12 \]
\[ C = \frac{M}{K} = \frac{12}{1} = 12 \]
\[ i_c = \frac{r}{M} = \frac{0.13}{12} = 0.0108 \]
\[ i_p = i_a = (1 + i_c)^C - 1 = (1 + 0.0108)^{12} - 1 = 0.1376 \text{ (13.76\%)} \]

**Second cash flow:**
It is based on equal end-of-year deposit over 5 years with the same interest compounding.
\[ K = 1, M = 12 \]
\[ C = \frac{M}{K} = \frac{12}{1} = 12 \]
\[ i_p = i_a = (1 + i_c)^C - 1 = (1 + 0.0108)^{12} - 1 = 0.1376 \text{ (13.76\%)} \]
\( A \) can be calculated by equating the future worth of the first cash flow to the future worth of the second cash flow as follows:
\[ 100(F/A, 13.76\%, 5) + 20(F/A, 13.76\%, 3) = A(F/A, 13.76\%, 5) \]
From the equal payment series compound amount formula (Table 3.4/Textbook/Park 4\textsuperscript{th} ed.):
\[ A = 110.43 \]

2. Base: Move all cash flows to year 9.
\[ 0 = -800(F/A, 9\%, 2)(F/P, 14\%, 8) + 700(F/P, 14\%, 7) + 700(F/P, 14\%, 4) \]
\[ -950(F/A, 14\%, 2)(F/P, 14\%, 1) + x - 800(P/A, 14\%, 3) \]
\[ 0 = -800(2.14)(2.8526) + 700(2.5023) + 700(1.6890) \]
\[ -950(2.14)(1.14) + x - 800(2.3216) \]
\[ x = 6124.64 \text{ (Factors were taken from the Table/p.889 of Park/4\textsuperscript{th} ed.)} \]

3. Given:
\[ P = 300 000 - 100 000 = 200 000 \]
\( r = 9\%, M = 12 \) (compounding monthly), \( K = 12 \) (monthly payment)
\[ C = \frac{M}{K} = \frac{12}{12} = 1 \]
\[ i_p = (1 + i_c)^C - 1 = i_c = \frac{r}{M} = \frac{0.09}{12} = 0.0075 \text{ (0.75\%)} \]
\( N = Mn = 12(5) = 60 \) months

**Find:** \( A \)
\[ A = P(A/P, 0.75\%, 60) = 200 000(0.0208) = 4160 \text{ From Table/p.872} \]