IEGR 350: Engineering Economy
Fall 2015
M. Salimian **Your Name:**

Quiz 1

50 Points (End time: 9:20am)

HW Question Quiz: (0 points – Deleted from the test)
As a principal in the consulting firm where you have worked for 20 years, you have accumulated 5000 shares of company stock. One year ago, each share of stock was worth $40. The company has offered to buy back your shares for $225,000. At what interest rate would the firm's offer be equivalent to the worth of the stock last year?

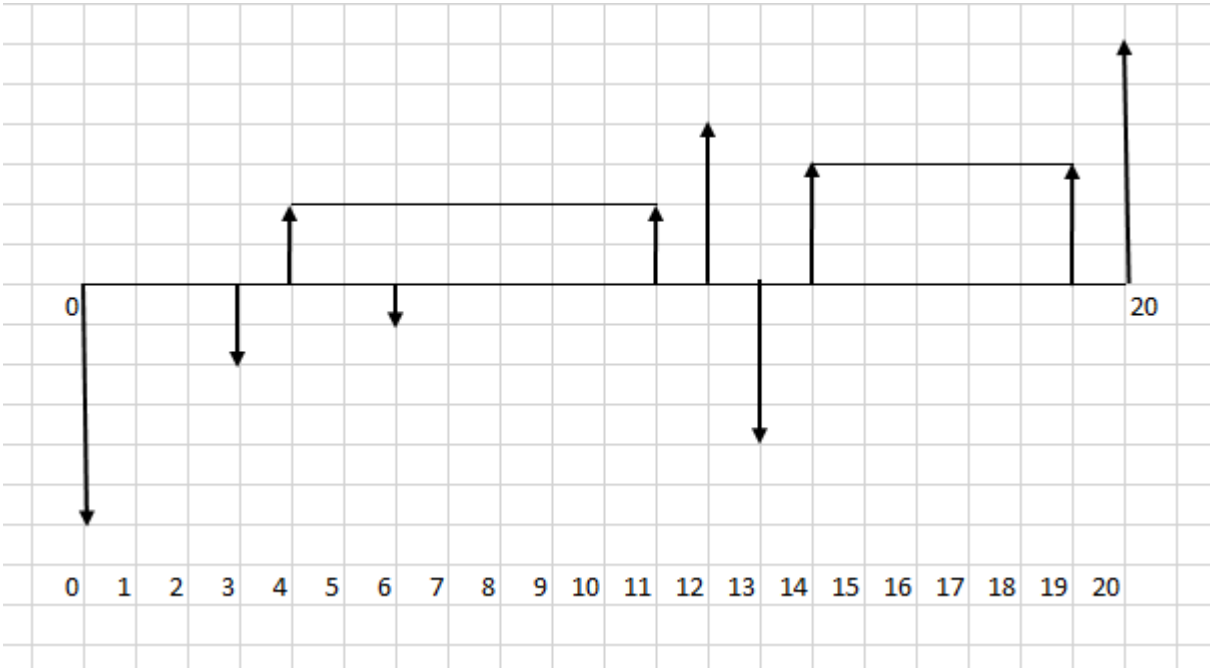
(Problem 1.28)

5,000(40)(1+i) = 225,000

(1+i) = 1.125

i = 0.125 = 12.5% per year

Assignment Question Quiz: (50 points)
For the cash-flow provided in the next page, find the equivalence at year 10. Interest rate is 15% compounded annually. Use either formula sheet or table for 15% interest rate. Each horizontal gridline represents 1 year and each vertical ones $664.53.



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Solution:

Several ways to do it. The following is based on finding the present worth of each separate cash flow, adding them together and then finding the future worth of that cash flow at year 10.

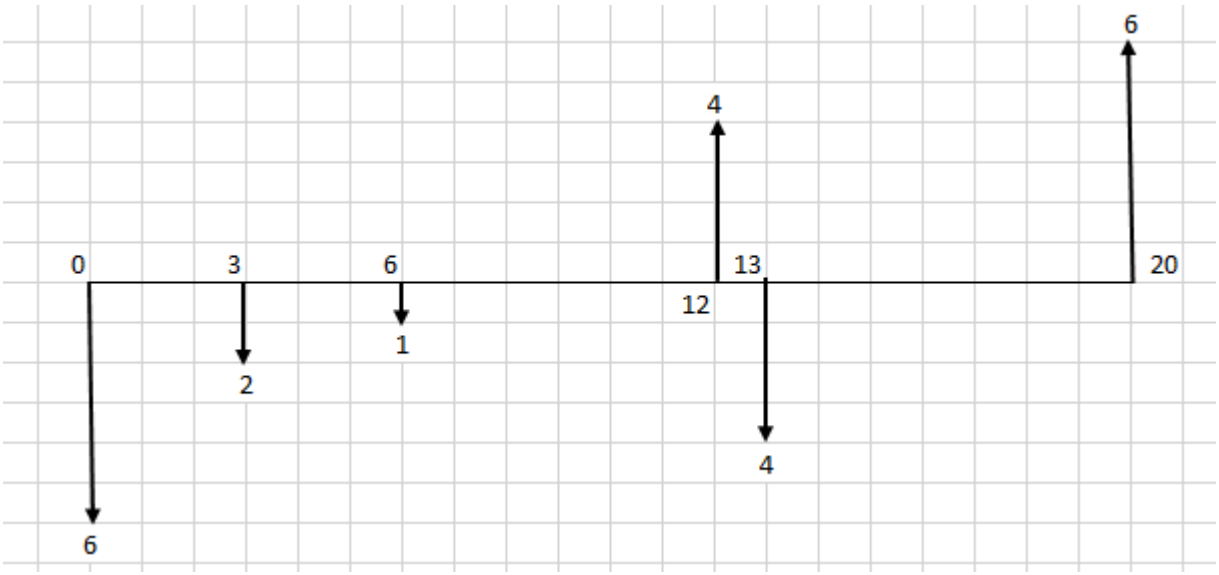
One important observation in here is the fact that all payments are made at exact grid sizes. For example, one is 6 grid height, another one 2 grid size and so on. Thus instead of multiplying each payment's height by $664.43 we can simply use the heights for our calculation and then multiply the final solution by $664.53. That is the same as factoring out 664.53 from calculations.

First group of payments are single payments over the duration of project. There are 4 payments (downward direction—thus presented by negative values) at time 0, 3, 6, and 13 respectively. We also have two single payment (upward direction – thus presented by positive values) at times 12 and 20.

PW1 = - 6 - 2(P/F, 15%, 3) - 1(P/F, 15%, 6) - 4(P/F, 15%, 13) + 4(P/F, 15%, 12) + 6(P/F, 15%, 20)

Using the factor values for (P/F, 15%, n) from the table we have"

PW1 = - 6 - 2(0.6575) - 1(0.4323) - 4(0.1625) + 4(0.1869) +6(0.0611) = - 8.3973 +1.1142 = - 7.2831



There are also two separate series of annual cash flows series, first one from year 4 to year 13 (2 grid sizes) and second on from year 14 to year 19 (3 grid sizes). We can use (P/A, 15% n) factor to find the present worth of each series. However, we need to be careful of what point the resulting present worth of the series actually occurs. For example, for the first series and comparing it to the standard form, it is a series of equal payments for 8 years beginning at year 4 each at 2 grid sizes. Thus, 2(P/A. 15%, 8) will give its present worth at year 0 for the standard series but for our cash flow that is year 3. Same is true for the second series beginning from year 14, ending at year 19 for 3 grid sizes. For that series, 3(P/A, 15%, 6) will be a single payment at time 13. So, for each one we will also multiply them by the proper (P/F, 15%, n) values.

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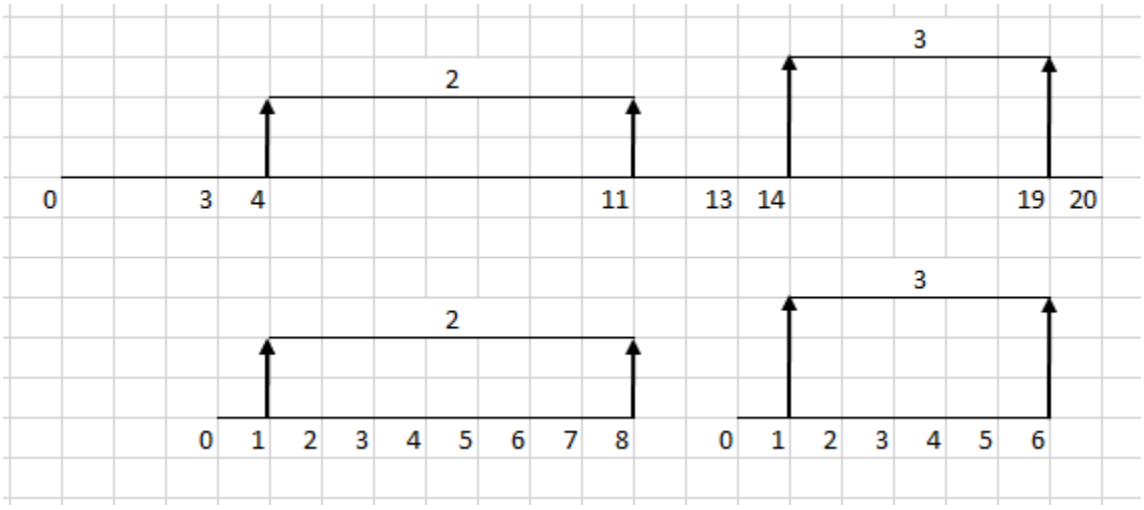
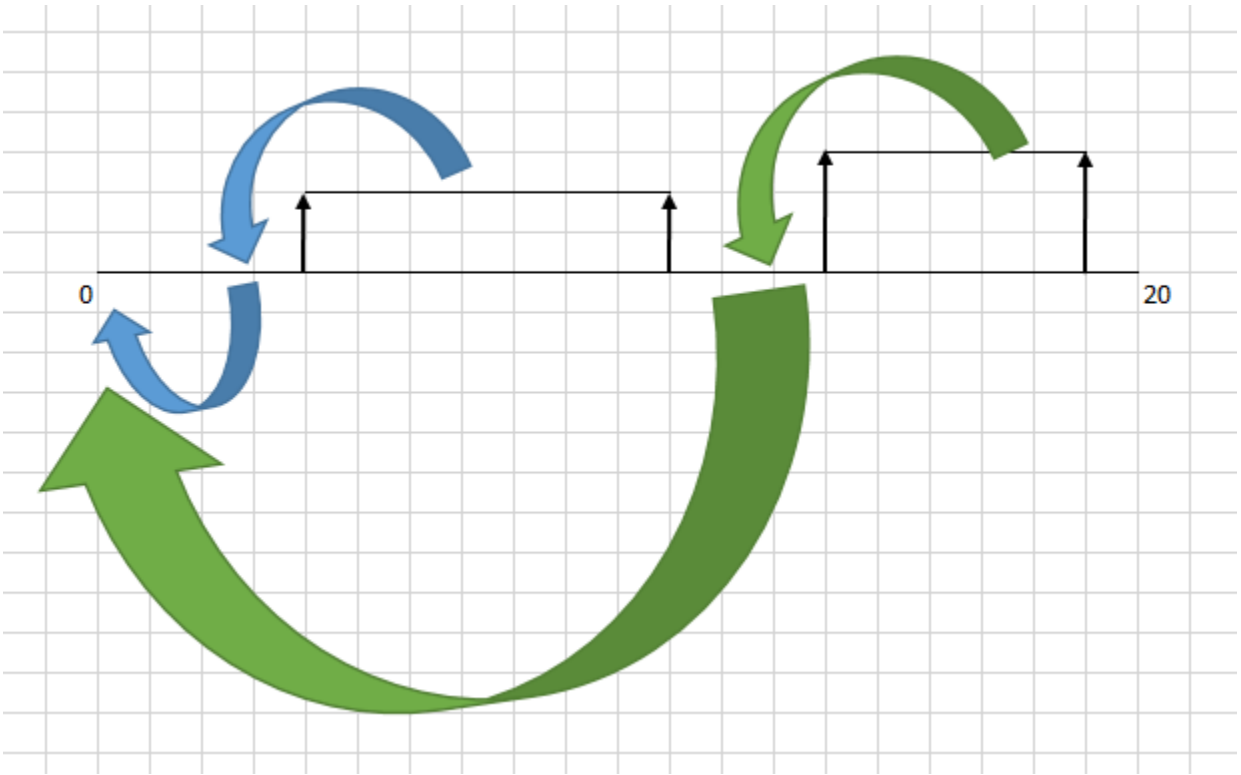


PW2 = [2(P/A. 15%, 8)] (P/F, 15%, 3) + [3(P/A, 15%, 6)] (P/F, 15%, 13) =

2 (4.4873) (0.6575) + 3 (3.7845) (0.1625) = 7.7457



PW = PW1 + PW2 = - 7.2831 + 7.7457 = + 0.4626

Now, we will find the future worth of this payment (at year 0) in year 10 using (F/P, 15%, 10), which from the table is 4.0456.

FW = 0.4626 (4.0456) = 1.8715

Multiplying it by $664.53, the final answer is:

1.8715 (664.53) = 1243.66

Grading Scheme:

Correct answer (regardless of the approach taken) → 30 points

Work shown → 10 points

Work explained → 10 points

Or,

Incorrect answer → no points

Partial credits for correct work shown and explained