HW 2.1(b) Key

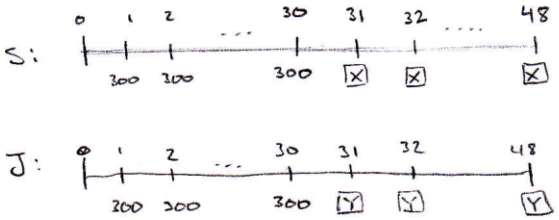
1. Susan and Jeff each make deposits of 300 at the end of each year for 30 years.

Starting at the end of year 31, Susan makes annual withdrawals of X for 18 years and Jeff makes annual withdrawals of Y for 18 years. . Both funds have a balance of 0 after the last withdrawal.

Susan's fund earns an annual effective interest rate of 5.3%. Jeff's fund earns an annual effective interest rate of 6.5%.

Calculate $Y - X$. [3.a-c #02]

A) 646 B) 620 C) 627 D) 633 E) 639



$300\, s_{\overline{30}|5.3\%} = X\, a_{\overline{18}|5.3\%} \rightarrow X = 1837.91$

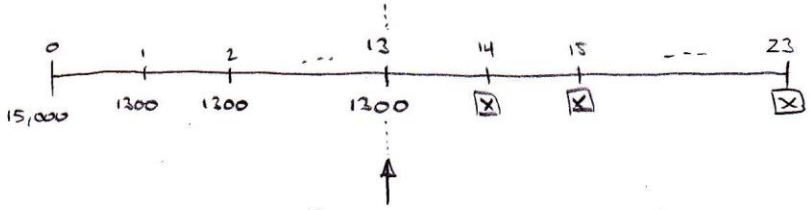
$300\, s_{\overline{30}|6.5\%} = Y\, a_{\overline{18}|6.5\%} \rightarrow Y = 2483.83$

$Y - X = 645.92$

2. An investment requires an initial payment of 15,000 and annual payments of 1,300 at the end of each of the first 13 years. Starting at the end of year 14, the investment returns 10 equal annual payments of X.

Determine X to yield an effective rate of 7% over the 23 year period. [3.a-c #06]

A) ~~8,850~~ 8875 B) 8,350 C) 8,500 D) 8,700 E) 9,050



$15{,}000(1.07)^{13} + 1300\, s_{\overline{13}|7\%} = X\, a_{\overline{10}|7\%}$

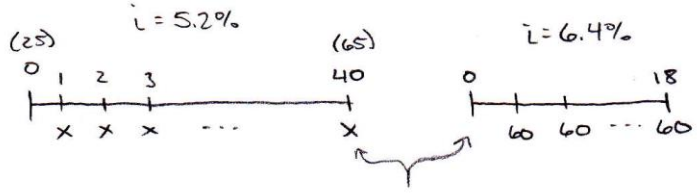
$62{,}330.51 = X\, a_{\overline{10}|7\%}$

$X = 8874.46$

3. A person age 25 wishes to accumulate a fund for retirement by depositing an amount X at the end of each year into an account paying 5.2% interest. At age 65, the person will use the entire account balance to purchase a 18-year 6.4% annuity-immediate with annual payments of 60,000.

Find X. [3.a-c #16]

[A] 4,970 B) 4,670 C) 4,750 D) 4,820 E) 4,900



$X \, s\overline{40}|5.2\% = 60 \, a\overline{18}|6.4\%$

$X \, s\overline{40}|5.2\% = 630.5823$

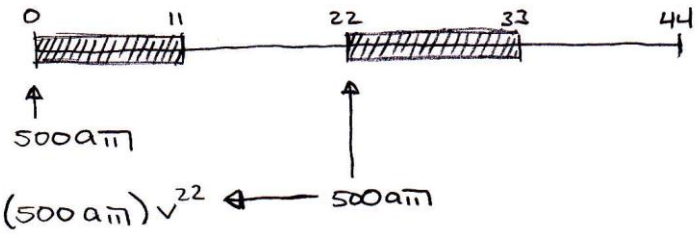
$X = 4.971$

4. At an annual effective interest rate of 6.9%, an annuity immediate with $4N$ level annual payments of 500 has a present value of 6862.

Determine the fraction of the total present value represented by the first set of N payments and the third set of N payments combined. [3.a-c #05]

[A] 68% B) 61% C) 64% D) 71% E) 74%

$6862 = 500 \, a\overline{4N}|6.9\%$ $\xrightarrow{\text{BA II}}$ $4N = 44 \rightarrow N = 11$



$$\frac{500 a\overline{n}| + 500 a\overline{n}| v^{22}}{6862} = \frac{500 \, a\overline{n}|(1+v^{22})}{6862} = \frac{4636.24}{6862} = 67.56\%$$

5. To be added.