Name: HW 1.4 (b) Key

1. Bryce is scheduled to receive two future payments of 1700. The first payment will occur at the end of year n, and the second payment occurs 11 years after the first payment. Assuming an annual effective interest rate of 6.7%, the present value of the two payments is 957.56. Find n.

$\boxed{\text{A)}}$ 15 B) 12 C) 13 D) 14 E) 16

$i = 6.7\%$

$957.56 = 1700v^n + 1700v^{n+11}$

$957.56 = v^n(1700 + 1700v^{11})$

$v^n = 0.3780$

$n = \dfrac{\ln(0.3780)}{\ln(v)} = \boxed{15}$

2. You are given two loans, with each loan to be repaid by a single payment in the future. Each payment includes both principal and interest.

The first loan is repaid by a 2200 payment at the end of 3 years. The interest is accrued at 9% per annum compounded semiannually.

The second loan is repaid by a 1600 payment at the end of 8 years. The interest is accrued at 11% per annum compounded semiannually.

The two loans are to be consolidated. The consolidated loan is to be repaid by two equal installments of X, with interest at 14% per annum compounded semiannually. The first payment is due immediately and the second payment is due one year from now.

Calculate X. [2.a-b #06]

$\boxed{\text{A)}}$ 1264 B) 1226 C) 1239 D) 1252 E) 1277

$PV = 2200(1.045)^{-6} + 1600(1.055)^{-16} = 2368.70$

$2368.70 = X + X(1.07)^{-2}$

$X = \boxed{1264.36}$

3. You are given the following data on three series of payments.

	Payment at end of year			AV at end of
	7	14	21	year 21
Series A	320	180	270	X
Series B	0	430	790	X + 180
Series C	Y	620	0	X

Assume interest is compounded annually.

Calculate Y. [2.a-b #09]

$\boxed{\text{A)}}$ 146 B) 151 C) 155 D) 160 E) 164

A: $320(1+i)^{14} + 180(1+i)^{7} + 270 = X$

B: $430(1+i)^{7} + 790 = X + 180$

A - B: $320(1+i)^{14} - 250(1+i)^{7} - 520 = -180$

$320(1+i)^{14} - 250(1+i)^{7} - 340 = 0 \rightarrow i = 5.8920\%$, $X = 1251.96$

$Y(1+i)^{14} + 620(1+i)^{7} = X \rightarrow Y = \boxed{146.42}$

4. Payments of 100, 200, and 400 are made at the ends of years 5, 9, and 12, respectively. Assuming an annual effective interest rate of 8%, this sequence of payments is equivalent to a single payment of 700 at time T. Let S be the approximation of T obtained using the method of equated time. Find S - T.

$\boxed{\text{A)}}$ 0.25 B) 0.20 C) 0.23 D) 0.28 E) 0.30

$i = 8\%$

$700v^{T} = 100v^{5} + 200v^{9} + 400v^{12} \rightarrow v^{T} = 0.4671 \rightarrow T = 9.89$

$$S = \frac{100(5) + 200(9) + 400(12)}{100 + 200 + 400} = 10.14$$

$S - T = \boxed{0.25}$

5. Vicky borrows P at an annual effective rate if 5%. She agrees to repay the loan by making the following payments: A payment of 450 at the end of year 2, a payment of 400 at the end of year 4, a payment of 200 at the end of year 6, and and a payment of X at the end of year 7.

The method of equated time can be used to determine that Vicky could have also repaid the loan by making a payment of 1050+X at approximately time t = 4.7188. Find X.

$\boxed{\text{A)}}$ 550 B) 350 C) 400 D) 450 E) 500

$$4.7188 = \frac{450(2) + 400(4) + 200(6) + X(7)}{450 + 400 + 200 + X} = \frac{3700 + 7X}{1050 + X}$$

$4954.74 + 4.7188X = 3700 + 7X$

$X = \boxed{550}$