

HW 3.2 (c) Key

1. A bank customer borrows X at an annual effective rate of 8% and makes level payments at the end of each year for n years.

- (i) The interest portion of the final payment is 62.48.
 - (ii) The total principal repaid as of time $(n - 1)$ is 6438.29.
 - (iii) The principal repaid in the first payment is Y .
- Calculate Y . [6.a #07]

☒ A) 266 B) 258 C) 274 D) 282 E) 290

$$I_n = 62.48 = 0.08 B_{n-1} \rightarrow B_{n-1} = 781$$

$$\text{Note: } P_n = B_{n-1} = 781$$

$$R = I_n + P_n = 843.48$$

$$X = \sum P_t = 6438.29 + 781 = 7219.29$$

$$I_1 = 0.08X = 577.54 \quad P_1 = R - I_1 = \boxed{265.84}$$

2. A loan is being amortized by means of level monthly payments at an annual effective interest rate of 4%. The amount of principal repaid in payment number 18 is 1,700 and the amount of principal repaid in payment t is 2,793.86. Calculate t . [6.a #09]

☒ A) 170 B) 175 C) 180 D) 185 E) 190

$$j = 0.32737\%$$

$$i = 4\%$$

$$P_{18} = 1700$$

$$P_t = 2793.86$$

$$1700(1+j)^{t-18} = 2793.86$$

$$t = \boxed{170}$$

3. Larry is repaying a loan with payments of \$1,200 at the end of every two years. If the amount of the interest in installment number 8 is \$991, find the amount of principal in installment number 15. Assume an annual effective interest rate of 6%. [6.a #12]

- (A) At least \$470, but less than \$480
 (B) At least \$430, but less than \$440
 (C) At least \$440, but less than \$450
 (D) At least \$450, but less than \$460
 (E) At least \$460, but less than \$470

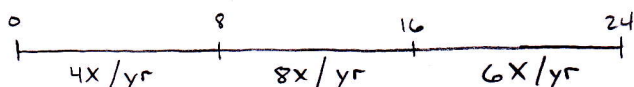
$$i = 6\% \quad j = 12.36\%$$

$$R = 1200 \quad I_8 = 991 \rightarrow P_8 = 209$$

$$P_{15} = 209(1+j)^7 = \boxed{472.53}$$

4. Jason takes out a 24-year loan, which is repaid with annual payments at the end of the year. He repays the loan by making payments of $4X$ during years 1-8, $8X$ during years 9-16, and $6X$ during years 17-24. Interest is charged on the loan at an annual effective rate of i , $i > 0$. The amount of interest repaid during year 9 is twice as much as the amount of interest repaid during year 17. Calculate i . [6.a #19]

- (A) 5.2% (B) 4.7% (C) 4.9% (D) 5% (E) 5.4%



$$I_9 = 2I_{17}$$

$$I_9 = 2I_{17} \rightarrow iB_8 = 2iB_{16} \rightarrow B_8 = 2B_{16}$$

$$\rightarrow 8Xa_{\overline{8}|i} + 6Xa_{\overline{8}|i} \cdot v^8 = 2 \cdot 6Xa_{\overline{8}|i} \rightarrow 8 + 6v^8 = 12 \rightarrow i = \boxed{5.2\%}$$

5. A 1,200 loan is to be repaid with equal payments at the end of each year for 36 years. The principal portion of payment 17 is 1.9 times the principal portion of payment 10. Calculate the total amount of interest paid on the loan. [6.a #32]

- (A) 3,107 (B) 3,231 (C) 3,356 (D) 3,480 (E) 3,604

$$1200 = Ra_{\overline{36}|i}$$

$$P_{17} = 1.9P_{10} \rightarrow \frac{P_{17}}{P_{10}} = 1.9 \rightarrow (1+i)^7 = 1.9 \rightarrow i = 9.6\%$$

$$R = 119.64$$

$$\Sigma \text{ of Pmts} = 36R = 4307.15$$

$$\text{Total Interest} = \boxed{3107.15}$$