HW 5.3 - 5.4 (a) Key

1. You are given the following information about the activity in two different investment accounts:

Account K			
Date	Fund value before activity	Deposit	Withdrawal
January 1, 1999	175		
July 1, 1999	200		X
October 1, 1999	165	$2X$	
December 31, 1999	205		

t	0	$\frac{1}{2}$	$\frac{3}{4}$	1
Beg	0	200	165	205
Trans.	+175	$-X$	$+2X$	-205
End	175	$200-X$	$165+2X$	0

Account L			
Date	Fund value before activity	Deposit	Withdrawal
January 1, 1999	170		
July 1, 1999	205		X
December 31, 1999	165		

t	0	$\frac{1}{2}$	1
Beg	0	205	165
Trans	+170	$-X$	-165
End	170	$205-X$	0

During 1999, the dollar weighted return for investment account K equals the time weighted return for investment account L, which equals i. Calculate i.
[5.d-e #02]

A) 6.6% B) 6.2% C) 6.4% D) 6.5% E) 6.8%

$$i = \frac{30-X}{175(1)-X\left(\frac{1}{2}\right)+2X\left(\frac{1}{4}\right)} = \frac{205}{170}\frac{165}{205-X} - 1 \rightarrow \frac{30-X}{175} + \frac{175}{175} = \frac{205}{170}\frac{165}{205-X}$$

$$\frac{205-X}{175} = \frac{205}{170}\frac{165}{205-X} \rightarrow (205-X)^2 = 34{,}819.85 \rightarrow X = 18.4 \rightarrow \boxed{i = 6.6\%}$$

2. An investor deposits 275 in an account on January 1. The following summarizes the activity in the account during the year:

	Value Immediately	
Date	Before Deposit	Deposit
March 15	300	40
June 1	365	70
October 1	460	35

On June 30, the value of the account is 442.5. On December 31, the value of the account is X. Using the time-weighted method, the equivalent annual effective yield during the first 6 months is equal to the (time-weighted) annual effective year during the entire 1-year period. Calculate X. [5.d-e #03]

A) 567.27 B) 564.43 C) 570.1 D) 572.94 E) 575.73

	(1/1)	(3/15)	(6/1)	(6/30)	(10/1)	(12/31)
t	0	$\frac{2.5}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{9}{12}$	1
Beg	0	300	365	442.5	460	X
Trans	+275	+40	+70	0	+35	$-X$
End	275	340	435	442.5	495	0

$$\frac{300}{275}\frac{365}{340}\frac{442.5}{435}\frac{460}{442.5}\frac{X}{495} = \left(\frac{460}{442.5}\frac{X}{495}\right)^2 \rightarrow \boxed{X = 567.27}$$

3. On January 1, 2010 Luciano deposits 150 into an investment account. On April 1, 2010, when the amount in Luciano's acount is equal to X, a withdrawal of W is made. No further deposits or withdrawals are made to Luciano's account for the remainder of the year. On December 31, 2010, the amount in Luciano's account is 140. The dollar-weighted return over the 1-year period is 15.69%. The time-weighted return over the 1-year period is 14.87%. Calculate X. [5.d-e #08]

A) 160 B) 163 C) 166 D) 170 E) 173

	t	0 (1/1)	$\frac{3}{12}$ (4/1)	1 (12/31)
Beg		0	X	140
Trans		+150	-W	-140
End		150	X-W	0

DWR: $0.1569 = \dfrac{W-10}{150(1)-W(\frac{3}{4})} \rightarrow W = 30$

TWR: $0.1487 = \dfrac{X}{150}\dfrac{140}{X-30} - 1 \rightarrow \boxed{X = 160}$

4. David's stock portfolio has had the following activity since he began investing:

January 1, 2009	Value = \$180,000
January 1, 2010	Value = \$216,000 immediately preceding a deposit of \$20,000
January 1, 2011	Value = \$272,000 immediately preceding a deposit of \$28,000
January 1, 2012	Value = \$334,000 immediately preceding a withdrawal of \$$X$
January 1, 2013	Value = \$180000

You may assume a 8% annualized time-weighted return over the 4-year period from January 1, 2009, to January 1, 2013. Determine X, the amount of the withdrawal made on January 1, 2012. [5.d-e #09]

A) At least \$130,000, but less than \$131,000
B) At least \$129,000, but less than \$130,000
C) At least \$131,000, but less than \$132,000
D) At least \$132,000, but less than \$133,000
E) At least \$133,000, but less than \$134,000

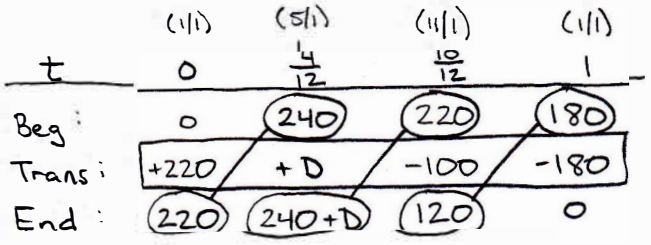
t	0	1	2	3	4
Beg	0	216	272	334	180
Trans	+180	+20	+28	-X	-180
End	180	236	300	334-X	0

$(1.08)^4 = \dfrac{216}{180}\dfrac{272}{236}\dfrac{334}{300}\dfrac{180}{334-X}$

$\boxed{X = 130,276.63}$

5. On January 1, an investment account is worth 220. On May 1, the value has increased to 240 and D is deposited. On November 1, the value is 220 and 100 is withdrawn. On January 1 of the following year, the investment account is worth 180. The time-weighted return is 0%. Calculate the dollar-weighted return. [5.d-e #10]

A) –21.2% B) –17.9% C) –19% D) –20.1% E) –22.3%



TWR: $0 = \frac{240}{220}\frac{220}{240+D}\frac{180}{120} - 1 \rightarrow D = 120$

DWR: $\frac{60 - D}{220(1) + D(\frac{2}{3}) - 100(\frac{1}{6})} = \boxed{-21.18\%}$