HW 9.1 - 9.2 (a) Key

1. The following table shows the forward prices for forward contracts with Stock ABC as the underlying asset:

Years to Expiration	Forward Price
1	50
2	53
3	61

The following table shows the spot rates of interest:

Term to Maturity (Years)	Spot Rate
1	5.6%
2	6.2%
3	6.5%

X is the level swap price under a 3-year swap contract with the same underlying asset. Determine X. [19 #01]

A) 54.42 B) 53.33 C) 53.88 D) 54.97 E) 55.51

$$\frac{X}{1.056} + \frac{X}{(1.062)^2} + \frac{X}{(1.065)^3} = \frac{50}{1.056} + \frac{53}{(1.062)^2} + \frac{61}{(1.065)^3}$$

$$X = \boxed{54.42}$$

2. The one-year forward price of a certain commodity is \$175 and the two-year forward price is \$$X$. A two-year swap contract on the commodity has level payments of \$184.4. The interest rate earned on a one-year zero-coupon bond is 4.5% and one two-year zero-coupon bond is 6%. Determine X. [19 #02]

A) 194.51 B) 191.59 C) 192.56 D) 193.53 E) 195.48

$$\frac{184.4}{1.045} + \frac{184.4}{(1.06)^2} = \frac{175}{1.045} + \frac{X}{(1.06)^2}$$

$$X = \boxed{194.51}$$

3. A one-year forward contract has a forward price of \$104 and a two-year forward contract has a forward price of \$113. The yield curve is flat at 4.5% effective per annum. X is the implicit borrowing and lending that occurs at the end of one year under a two-year swap contract with a level swap price. Determine X. [19 #03]

[A] \$4.40 B) \$3.87 C) \$4.05 D) \$4.22 E) \$4.58

L = level swap price

$$\frac{L}{1.045} + \frac{L}{(1.045)^2} = \frac{104}{1.045} + \frac{113}{(1.045)^2}$$

$$L = 108.40$$

Implicit lending at $t=1$: $108.4 - 104 = \boxed{4.4}$

4. You are given the following information concerning a certain commodity:

One-year forward price = \$75
Two-year forward price = \$82
Two-year swap price = \$78.36
One-year spot rate of interest = 7%

X is the one-year forward rate (i.e., the effective rate for the one-year period beginning one year from now). Determine X. [19 #04]

[A] 8.33% B) 7.67% C) 7.83% D) 8.00% E) 8.17%

$$\frac{78.36}{1.07} + \frac{78.36}{(1+s_2)^2} = \frac{75}{1.07} + \frac{82}{(1+s_2)^2}$$

$$(1+s_2)^2 = 1.159167$$

$$(1.07)(1+f_1) = 1.159167$$

$$\boxed{f_1 = 8.33\%}$$

5. Two interest rate forward contracts are available for interest payments due 1 and 2 years from now. The forward interest rates in these contracts are based on a one-year spot rate of 5.75% and a two-year spot rate of 6.75%. X is the level swap interest rate in a 2-year interest rate swap contract that is equivalent to the two forward contracts. Determine X. [19 #05]

A) 6.72% B) 6.11% C) 6.31% D) 6.52% E) 6.92%

$$1 = \frac{R}{1.0575} + \frac{R}{(1.0675)^2} + \frac{1}{(1.0675)^2}$$

$$R = \boxed{0.06717}$$