HW 7.4 Key

1. A1 stock index pays dividends continuously at a constant rate of 6.7% per annum. The current price of one unit of the index is \$77. What is the price of a prepaid forward contract for delivery of one unit of the index in 6 months? [18 #02]

[A] \$74.46 B) \$76.96 C) \$79.45 D) \$81.95 E) \$84.44

$$F^P = S_0 e^{-\delta t} = 77 e^{-0.067/2} = \boxed{74.46}$$

2. A stock has a current price of \$109. The continuously compounded rate of interest is 7.2% per annum, and the continuous dividend yield is δ per annum. A 9-month forward contract has a difference between the forward price and the prepaid forward price of \$5.90. Determine δ. [18_a3]

[A] 3.3% B) 3.1% C) 3.5% D) 3.6% E) 3.8%

$$F = 109 e^{(0.072-\delta)0.75} \qquad F^P = 109 e^{-\delta(0.75)}$$

$$F - F^P = 109 e^{0.072(0.75)} e^{-\delta(0.75)} - 109 e^{-\delta(0.75)} = 5.9$$

$$109 e^{-\delta(0.75)} \left[e^{0.072(0.75)} - 1 \right] = 5.9$$

$$e^{-\delta(0.75)} = 0.975558 \rightarrow \delta = \boxed{3.299\%}$$

3. Stock P has a price of \$146 per share. The stock will pay a \$3.30 dividend per share in t months from now. The continuously compounded risk free rate of interest is 5%. The six month prepaid forward price is \$142.80. Calculate t. [18_a4]

[A] 7.4 B) 7.0 C) 7.1 D) 7.3 E) 7.5

$$F^P = S_0 - PV(Div)$$

$$142.8 = 146 - 3.30 e^{-0.05t}$$

$$t = 0.61543 \text{ (years)}$$

$$n = \boxed{7.385} \text{ (months)}$$

4. Consider three stocks: Stock A, Stock B, and Stock C.

The current price of each stock is S_0.

Stock A does not pay dividends. A one-year prepaid forward contract on a share of Stock A has a price of X.

Stock B pays continuous dividends at a rate of 2% per annum. A one-year prepaid forward contract on a share of Stock B has a price of Y.

Stock C will pays dividends of $0.01S_0$ in 2 months and $0.03S_0$ in 8 months. A one-year prepaid forward contract on a share of Stock C has a price of Z.

The continuously compounded risk-free interest rate is 4%.

Determine $(X+Y+Z)/S_0$. [18_a5]

[A] 2.94 B) 2.76 C) 2.82 D) 2.88 E) 3.00

$F = FV(S_0) - FV(Div)$

$F = 88(1+j)^4 - 2.4(1+j)^3 - 2.4(1+j)^2 - 2.4(1+j) - 2.4$

$= \boxed{82.18}$

5. A stock pays a dividend of 4 per share in 6 months. The one-year forward price for the stock is the spot price plus 1.37. The one-year prepaid forward price is the one-year forward price minus 5.26. What is the prepaid forward price? [18_a6]

[A] 91.71 B) 86.21 C) 88.04 D) 89.88 E) 93.54

We know: ① $F = S_0 + 1.37$

② $F^P = F - 5.26$

③ $F^P = S_0 - 4e^{-r/2}$

② & ③ give: ④ $F - 5.26 = S_0 + 4e^{-r/2}$

① − ④ gives: ⑤ $5.26 = 1.37 + 4e^{-r/2}$ → $r = 5.577\%$

②: $F^P = F - 5.26$

$F^P = F^P e^{r/2} - 5.26$

$0.057355 F^P = 5.26$

$F^P = \boxed{91.71}$