1a) $5050 \times 1.035 = 5226.75$

Yes there is arbitrage short 1 futures contract and put the \$5050 into the risk free asset. Take the \$5226.75 from the account and pay 5200 for the forward profit \$26.75 per contract bought

1b. Yes, buy 1 ounce futures contract by shorting the risk-free asset. Get 5300 from the contract and use 5226.75 to pay back debt profit 73.75 per contract

2a) $(1+0.0325/2)^2 = 1.0326525 - 1 = 0.03266 \approx \boxed{3.266\%}$

2b) $(1+0.0325/2)^2 = (1+r_4/4)^4 \quad (1.0326525) = (1.0326525)^{\frac{1}{4}} = 0.03231 = \% 3.231$

2c) $(1+0.035/2)^2 = e^{r_c} \quad r_c \Rightarrow \ln(1.0326525) = 0.3213 \Rightarrow \% 3.213$

3) $\left(1+0.1715\left(\frac{30}{365}\right)\right)^{\frac{365}{30}} = 1.185663$

$10000 \cdot 1.185663 = \boxed{\$11856.63}$

4) $6M = e^{-0.03/2} = 0.9851 \quad 1Y = e^{-0.03(1)} = 0.9704$

$1.5Y = e^{-0.035(1.5)} = 0.9488 \quad 2Y = e^{-0.035(2)} = 0.9324$

a) $B_1 = 2.5(0.9851 + 0.9704 + 0.9488) + 102.50)(0.9324) \quad B_1 = 2.5(2.9043) + 95.57 \quad B_1 = 102.83$

b) $\sum_{i=1}^{20} e^{-R(t_i)t_i} = e^{-0.03/2} + e^{-0.03} + e^{-0.035(1)} + e^{-0.035(2)} + e^{-0.0425(2.5)} + \dots + e^{-0.045(10)}$

≈ 14.891

$B_2 = 3.00(14.891) + 100(0.5379) = 44.67 + 53.79 = 98.46$

c) $102.83 = \sum_{i=1}^{4} \frac{2.5}{(1+y/2)^i} + \frac{106}{(1+y/2)^4} \Rightarrow y = 3.42\%$

$y \approx 6.15\%$

5a) $1.15 \cdot 1{,}000{,}000 = 1{,}150{,}000$ owed for futures contract

$1.175 \cdot 1{,}000{,}000 = 1{,}175{,}000$ realized at maturity

$1.175 - 1.15 = 0.025$

$0.02 \cdot 1{,}000{,}000 = \$25{,}000$ profit

5b) $1.15 = 1.1e^{\frac{x}{2}}$

$x = 2\ln\left(\frac{1.15}{1.1}\right)$

$x = 0.0889 \Rightarrow 8.89\%$