12 $r = 3.25\% \to m = 2$; $r_c = m\ln(1+\frac{R_m}{m})$, $R_m = m(e^{R_c/m} - 1)$, $A(1+\frac{R}{m})$

~~you~~ This rate causes A to grow to $A(1+\frac{R}{m})^m = A(1+\frac{0.0325}{2})^2$

$= 1.033A$

i. $m=1 \to A(1+\frac{R}{1})^1 = 1.033A \to (1+R) = 1.033 \to R = 0.033$

$\approx \boxed{3.3\%}$

ii. $m=4 \to A(1+\frac{R}{4})^4 = 1.033A \to 1+\frac{R}{4} = 1.008 \to 4+R = 4.032$

$\to R = 0.032 \approx \boxed{3.2\%}$

iii. $m \to \infty \to A \to Ae^{rT} = 1.033A \to e^r = 1.033 \to r = \ln(1.033)$

$\to 0.032 \approx \boxed{3.2\%}$

→ Equivalent rates decrease w/ compounding frequency.

14

In theory → \$5,050 $\xrightarrow[3.5\%]{1\text{ year}}$ $S_0e^{rT} = \$5{,}050e^{.035}$

$\approx$ \$5230 → If quote differs from this, arbitrage opportunity exists.

i. \$5200 < \$5230 → arbitrage, someone can borrow + sell (short sell gold) → have \$5050 → invest → end up w/ \$5230; ~~enter~~ enter \$5200 forward contract to buy gold & return ∴ profit = \$5230 − \$5200 = $\boxed{\$30}$

ii. \$5300 > \$5230; yes arbitrage → can borrow \$5050 at r = 3.5% interest → use to buy gold at spot price → enter \$5300 forward contract to sell → profit the difference \$5300 − \$5230 = (\$70)

13 excellent → 17.5% annualized → daily $= \frac{0.175}{365} = 0.0005$

$\to 10000(1+0.0005)^{30} \approx \boxed{\$10151.1}$

14

1) 5.0% annual 2x a year → 2.5% every 6M

for 100 face value

	$2.5	$2.5	$2.5	$102.5
	6M	1Y	18M	2Y
	3%	3%	3.5%	3.5%

discount factor = e^{-rT} ; $T = 6M \rightarrow 2.5e^{-.03(.5)} = 2.46$

$T = 1Y \rightarrow 2.5e^{-.03(1)} = 2.43$

$T = 18M \rightarrow 2.5e^{-.035(1.5)} = 2.37$

$T = 2Y \rightarrow 102.5e^{-.035(2)} = 95.57$

∴ Price = \$2.46 + \$2.43 + \$2.37 + \$95.57 = $\boxed{\$102.83}$

2) 6% annual 2x a year → 3% every 6M

$3

1/2	1	3/2	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
3%	3%	3.5%	3.5%	4.25%					4.5										$103

$\underbrace{\ }_{\$11.515}$ $\underbrace{\ }_{\$16.3}$ $\underbrace{\ }_{\$21.130}$ $66.3

$\boxed{\$115.26}$

3. $2.5e^{-\frac{y}{2}} + 2.5e^{-y} + 2.5e^{-\frac{3y}{2}} + 102.5e^{-2y} = \$102.83$

$y = 0.035 = \boxed{3.5\%}$

$\sum_{.5}^{9.5} 3e^{-ty} + 103e^{-10y} = \$115.26$

$\rightarrow y = .045 = \boxed{4.5\%}$

1.5

1 sans hedging → 1.175 × 1000000 = $1175000 ; w/ contract → 1.150 × 1000000 = 1150000 → difference → $\boxed{\$25000 \text{ saved}}$

ii $X_{fwd}(T) = e^{-\overbrace{(r_{Eur} - r_{USD})}^{x})T} X_0 \rightarrow \frac{1.150}{1.100} = e^{-x \cdot .5}$

$\rightarrow -.5x = \ln\left(\frac{1.150}{1.100}\right) \rightarrow -.5x = 0.044 \rightarrow x = -0.088 \rightarrow$

$r_{Eur} - r_{USD} = -0.088 \rightarrow r_{USD} - r_{Eur} = 0.088 = \boxed{8.8\%}$