Q1

Cash flows:

Time	0	0.5	1	1.5	2
swap 1	100	100.35			
swap 2	100	0.4	100.4		
swap 3	100	0.5	0.5	100.5	
swap 4	100	0.6	0.6	0.6	100.6

$d(0.5) = \frac{100}{100.35} = 0.996512$

$d(1) = \frac{(100 - 0.4(d(0.5)))}{100.4} = 0.992046$

$d(1.5) = \frac{(100 - 0.5d(0.5) - 0.5d(1))}{100.5} = 0.985132$

$d(2) = \frac{100 - 0.6d(0.5) - 0.6d(1) - 0.6d(1.5)}{100.6} = 0.9763$

$f(0.5) = 2\left(d(0.5)^{-\frac{1}{2\times 0.5}} - 1\right) = 0.007$

$f(1) = 2\left(d(1)^{-\frac{1}{2\times 1}} - 1\right) = 0.008002$

$f(1.5) = 2\left(d(1.5)^{-\frac{1}{2\times 1.5}} - 1\right) = 0.010012$

$f(2) = 2\left(d(2)^{-\frac{1}{2\times 2}} - 1\right) = 0.012029$

3 17:37 92%

No. Date.

$$f(0.5) = \hat{r}(0.5) = 0.007$$

$$f(1) = 2\left(\frac{\frac{1}{d(1)}}{1+\frac{f(0.5)}{2}} - 1\right) = 2\left(\frac{\frac{1}{0.992046}}{1+\frac{0.007}{2}} - 1\right) = 0.009005$$

$$f(1.5) = 2\left(\frac{1}{d(1.5)} \div \left(1+\frac{f(0.5)}{2}\right) \div \left(1+\frac{f(1)}{2}\right) - 1\right) = 0.014037$$

$$f(2) = 2\left(\frac{1}{d(2)} \div \left(1+\frac{f(0.5)}{2}\right) \div \left(1+\frac{f(1)}{2}\right) \div \left(1+\frac{f(1.5)}{2}\right) - 1\right) = 0.018072$$

3 17:37 93%

No. Date.

Q2. Cash flow of "5s of Oct 16, 2017" is:

Time	0	0.5	1	1.5	2
Bond	P	2.5	2.5	2.5	102.5

where $P = 2.5(0.996512) + 2.5(0.992046) + 2.5(0.985132)$
$+ 102.5(0.9763)$

$P = \$107.5050$

Q3. Cash flow for par bond and swap:

Time	0	0.5	1	1.5	2	2.5
Date	Oct.16, 2015	Apr 16, 2016	Oct 16, 2016	Apr 16, 2017	Oct 16, 2017	Apr 16, 2018
Par Bond	1000	35	35	35	35	1035
Swap	1000	30	30	30	30	1030

There is arbitrage opportunity, by shorting Swap and longing Par Bond, we can get positive cash flow in the future.

1/1