Question 3: Derivatives Analysis and Valuation **(30 points)**

a)
The value of the floating rate bond is equal to the notional amount: $B_2 = 100$ million USD.

The value of the fixed rate bond is equal to:
$B_1 = 4 \cdot 0.97656 + 4 \cdot 0.94627 + 4 \cdot 0.90983 + 104 \cdot 0.87144 = 101.9604$ million USD.

Therefore, the value of this receiver swap is V = B1 - B2 = 1.96 million USD.

b)
The value of the swap becomes:
$$V = (4 - 2.400) \cdot 0.97656 + (4 - 3.202) \cdot 0.94627 + (4 - 4.005) \cdot 0.90983 + (4 - 4.405) \cdot 0.87144 = 1.9601$$

Therefore, V=1.96 million USD as before.

c)
We can ask ourselves: what is the annual coupon K_{SR} of a 4-year fixed coupon bond of notional 1 priced at par? This would correspond to the annual swap rate:
$$K_{SR} \cdot (0.97656 + 0.94627 + 0.90983 + 0.87144) + 0.87144 = 1$$
$$\Rightarrow K_{SR} = \frac{1 - 0.87144}{0.97656 + 0.94627 + 0.90983 + 0.87144} = 0.034707 .$$

Therefore, we get an annualised swap rate of 3.47%.