Question: Fixed Income Valuation and Analysis **(49 points)**

You are working in the Debt Capital Markets area of an investment bank on structured fixed income bonds.

In light of a very low interest rate environment you are suggesting to your client the issuance of a "Callable Stepped Coupon Bond" with a coupon that is gradually growing over time.

Market parameters are as follows:

	1 year	2 years	3 years
Yield	-0.25%	1.00%	2.50%
Spot Rate	①	②	③
Discount Factor	④	⑤	⑥
Forward Rate		⑦	⑧

Notes:
- Yield Convention: 30/360 with annual coupon payments.
- Spot Rates = zero coupon rates.
- Forward Rates: The forward interest-rates are 1-year interest rates for a forward contract starting 1 year prior to corresponding maturities.
- Negative coupons are allowed here.

a) Before considering the "Callable Stepped Coupon Bond" you are asked to answer some basic questions:

a1) Calculate the 8 missing values ① - ⑧ according to the given table above. (12 points)

a2) Calculate the price of a non-callable 3 years "Stepped Coupon Bond" with coupons equal to the forward rates of the respective year. [In case you have not solved question a1), assume -0.25%, 2.3% and 5.7% as the coupons for years 1, 2 and 3.] (4 points)

a3) A regular fixed coupon bond is called "par bond" when it quotes at par [i.e. its price is 100]. What brings a "Stepped Coupon Bond" to par? (Short reasoning – no calculation required) (4 points)

b) Next, you are asked to further analyze the "Stepped Coupon Bond" including a call right at 100% after 1 year:

b1) Calculate today's value of this bond assuming it is called after 1 year. (3 points)

b2) Where do you see the value of this bond compared to an identical one without such call feature? (i.e. higher, equal or lower: short reasoning – no calculation required) (4 points)

b3) Where do you see the modified duration of this bond compared to an identical one without such call feature? (i.e. higher, equal or lower: short reasoning – no calculation required) (4 points)

c) Finally, you are supposed to assess the risk/return profile of the given "Callable Stepped Coupon Bond":

c1) Calculate its modified duration. (Assume that the call is far out of the money and yield stands at 2.5% p.a.) (6 points)

c2) How do you assess its performance from an investor perspective in light of expected higher interest rate volatility? Explain. (4 points)

c3) What is its main risk factor from an investor perspective compared to an identical, non-callable bond? (4 points)

c4) What is, from an issuer perspective, the main selling argument for launching such a bond in the given market environment? (4 points)