Question #1 of 38

For a 3-year, semiannual coupon payment bond, the number of interest rate paths that would be generated using the pathwise valuation is *closest* to:

A) 4

B) 64

C) 32

Patrick Wall is a new associate at a large international financial institution. Wall has recently completed graduate school with a Master's degree in finance, and is also currently a CFA Level I candidate. His previous work experience includes three years as a credit analyst at a small retail bank. Wall's new position is as the assistant to the firm's fixed income portfolio manager. His boss, Charles Johnson, is responsible for getting Wall familiar with the basics of fixed income investing. Johnson asks Wall to evaluate the bonds shown in Table 1. The bonds are otherwise identical except for the call feature present in one of the bonds. The callable bond is callable at par and exercisable on the coupon dates only.

Table 1 Bond Descriptions

	Non-Callable	Callable Bond
Price	$100.83	$98.79
Time to Maturity (years)	5	5
Time to First Call Date	--	0
Annual Coupon	$6.25	$6.25
Interest Payment	Semi-annual	Semi-annual
Yield to Maturity	6.0547%	6.5366%
Price Value per Basis Point	428.0360	--

Wall is told to evaluate the bonds with respect to duration and convexity when interest rates declined by 50 basis at all maturities over the next six months.

Johnson supplies Wall with the requisite interest rate tree shown in Figure 1. Johnson explains to Wall that the prices of the bonds in Table 1 were computed using this interest rate lattice.

Johnson instructs Wall to try and replicate the information in Table 1 and use his analysis to derive an investment decision for his portfolio.

Figure 1

									15.44%
								14.10%	
							12.69%		12.46%
						11.85%		11.38%	
					9.75%		10.25%		10.05%
				8.95%		9.57%		9.19%	
			7.91%		7.88%		8.28%		8.11%
		7.35%		7.23%		7.74%		7.42%	
	6.62%		6.40%		6.37%		6.69%		6.54%
6.05%		5.95%		5.85%		6.25%		5.99%	
	5.36%		5.17%		5.15%		5.40%		5.28%
		4.81%		4.73%		5.05%		4.83%	
			4.18%		4.16%		4.36%		4.26%
				3.82%		4.08%		3.90%	
					3.37%		3.52%		3.44%
						3.30%		3.15%	
							2.84%		2.77%
								2.54%	
									2.24%
Years	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5

Wall is having a few problems computing the bond prices using the interest rate tree. He would like to compute the value of the non-callable bond at node A given the relevant part of the tree. Using the referenced portions of the tree, what is the value of the non-callable bond at node A?

Relevant part of interest rate tree:

		8.95%
	7.91%	

		7.23%

Corresponding part of non-callable bond tree:

		$92.38
A →	–	
		$96.83

Question #2 of 38

The value of the bond at node A is *closest* to:

A) $94.01.

B) $90.56.

C) $97.02.

Question #3 of 38

Johnson asks Wall to compute the value of the call option. Using the given information what is the value of the embedded call option?

A) $1.21.

B) $0.00.

C) $2.04.

Question #4 of 38

Wall is a little confused over the relationship between the embedded option and the callable bond. How does the value of the embedded call option change when interest rate volatility increases? The value:

A) increases.

B) may increase or decrease.

C) decreases.

Question #5 of 38

Wall wonders how the value of the callable bond changes when interest rate volatility increases. How will an increase in volatility affect the value of the callable bond? The value:

A) increases.

B) decreases.

C) may increase or decrease.

Question #6 of 38

Wall now turns his attention to the value of the embedded call option. How does the value of the embedded call option react to an increase in interest rates? The value of the embedded call is *most likely* to:

A) remain the same.

B) decrease.

C) increase.

Question #7 of 38

Wall believes he understands the relationship between interest rates and straight bonds but is unclear how callable bonds change as interest rates increase. How do prices of callable bonds react to an increase in interest rates? The price:

A) may increase or decrease.

B) decreases.

C) increases.

Question #8 of 38

The process of stripping is *most* likely to be used to earn arbitrage profits in a situation where:

A) a portfolio of treasury strips is trading for a lower price than an intact treasury bond.

B) one treasury bond trades at a lower price than another treasury bond with identical characteristics.

C) Security valuations are not consistent with the value additivity principle.

Question #9 of 38

Sam Roit, CFA, has collected the following information on the par rate curve, spot rates, and forward rates to generate a binomial interest rate tree consistent with this data.

Maturity	Par Rate	Spot Rate
1	5%	5.000%
2	6%	6.030%
3	7%	7.097%

The binomial tree generated is shown below (one year forward rates) assuming a volatility level of 10%:

0	1	2
5%	7.7099%	C
	A	9.2625%
		B

Roit also generated another tree using the same spot rates but this time assuming a volatility level of 20% as shown below:

0	1	2
5%	8.9480%	13.8180%
	5.9980%	9.2625%
		6.2088%

Is the binomial tree using the 20% volatility assumption calibrated properly?

A) The tree is not calibrated properly because adjacent nodes are not appropriate standard deviations apart.

B) The tree is calibrated properly.

C) The tree is not calibrated properly because it is not consistent with market prices.

Question #10 of 38

The government bond spot rate curve is given below:

Maturity (years)	Spot rate
0.5	1.25%
1.0	1.30%
1.5	1.80%
2.0	2.00%
2.5	2.20%
3.0	2.25%
3.5	2.28%
4.0	2.30%

Compute the issue price of a 3-year, 3% semiannual coupon government bond with a par value of $100.

A) $104.09

B) $102.20

C) $102.15

Question #11 of 38

With respect to interest rate models, backward induction refers to determining:

A) one portion of the yield curve from another portion.

B) convexity from duration.

C) the current value of a bond based on possible final values of the bond.

Question #12 of 38

A 3-year, 3% annual pay, $100 par bond is valued using pathwise valuation. The interest rate paths are provided below:

Path	Year 1	Year 2	Year 3
1	2%	2.8050%	4.0787%
2	2%	2.8050%	3.0216%
3	2%	2.0780%	3.0216%
4	2%	2.0780%	2.2384%

The value of the bond in path 3 is closest to:

A) $101.85

B) $99.88

C) $100.02

Question #13 of 38

Why is the backward induction methodology used to value a bond rather than a forward induction scheme?

A) The convexity of a bond changes over time.

B) The price of the bond is known at maturity.

C) Future interest rate changes are difficult to forecast.

Question #14 of 38

A 3-year, 3% annual pay, $100 par bond is valued using pathwise valuation. The interest rate paths are provided below:

Path	Year 1	Year 2	Year 3
1	2%	2.8050%	4.0787%
2	2%	2.8050%	3.0216%
3	2%	2.0780%	3.0216%
4	2%	2.0780%	2.2384%

The value of the bond in path 1 is *closest* to:

A) $100.18

B) $101.88

C) $98.77

Question #15 of 38

Using the following interest rate tree of semiannual interest rates what is the value of an option free bond that has one year remaining to maturity and has 5% coupon rate with semi-annual coupon payments.

Today	6 Months
	7.30%
6.20%	
	5.90%

A) 97.53.

B) 98.98.

C) 98.67.

Question #16 of 38

Which of the following choices is *least-likely* a property of a binomial interest rate tree?

A) Adjacent forward rates in a nodal period are one standard deviation apart.

B) Non-negative interest rates.

C) Higher volatility at higher rates.

Question #17 of 38

Tim Brospack is generating a binomial interest rate tree assuming a volatility of 15%. Current 1-year spot rate is 5%. The 1-year forward rate in the second year is either a low estimate of 5.250% or a high estimate of 7.087%. The middle 1-year forward rate in year three is estimated at 6.25%. The upper node 1-year forward rate in year three is *closest* to:

A) 6.445%

B) 7.747%

C) 8.437%

Question #18 of 38

A binomial model or any other model that uses the backward induction method cannot be used to value a mortgage-backed security (MBS) because:

A) the prepayments occur linearly over the life of an interest rate trend (either up or down).

B) the cash flows for the MBS are dependent upon the path that interest rates follow.

C) the cash flows for an MBS only depend on the current rate, not the path that rates have followed.

Question #19 of 38

Sam Roit, CFA, has collected the following information on the par rate curve, spot rates, and forward rates to generate a binomial interest rate tree consistent with this data.

Maturity	Par Rate	Spot Rate
1	5%	5.000%
2	6%	6.030%
3	7%	7.097%

The binomial tree generated is shown below (one year forward rates) assuming a volatility level of 10%:

0	1	2
5%	7.7099%	C
	A	9.2625%
		B

Roit also generated another tree using the same spot rates but this time assuming a volatility level of 20% as shown below:

0	1	2
5%	8.9480%	13.8180%
	5.9980%	9.2625%
		6.2088%

The one-year forward rate represented by 'B' is closest to:

A) 7.4223%

B) 8.7732%

C) 7.5835%

Question #20 of 38

Suppose that we calculate the value of an option-free, fixed-rate coupon bond, discounting the cash flows using two methods:

I. the zero-coupon yield curve.
II. an arbitrage-free binomial lattice.

Compared to the first methodology, the second method is expected to produce:

A) the same value.

B) a lower value if the bond carries a coupon higher than the corresponding benchmark bond.

C) a higher value in the presence of volatility.

Question #21 of 38

Using the following interest rate tree of semiannual interest rates what is the value of an option free semiannual bond that has one year remaining to maturity and has a 6% coupon rate?

	6.53%
6.30%	
	5.67%

A) 98.52.

B) 97.53.

C) 99.81.

Question #22 of 38

A bond with a 10% annual coupon will mature in two years at par value. The current one-year spot rate is 8.5%. For the second year, the yield volatility model forecasts that the one-year rate will be either 8% or 9%. Using a binomial interest rate tree, what is the current price?

A) 102.659.

B) 101.837.

C) 103.572.

Question #23 of 38

Which of the following is a *correct* statement concerning the backward induction technique used within the binomial interest rate tree framework? From the maturity date of a bond:

A) the corresponding interest rates and interest rate probabilities are used to discount the value of the bond.

B) a deterministic interest rate path is used to discount the value of the bond.

C) the corresponding interest rates are weighted by the bond's duration to discount the value of the bond.

Dawn Adams, CFA, along with her recently hired staff, have responsibilities that require them to be familiar with backward induction methodology as it is used with a binomial valuation model. Adams, however, is concerned that some of her staff, particularly those not enrolled in the CFA program, are a little weak in this area. To assess their understanding of the binomial model and its uses, Adams presented her staff with the first two years of the binomial interest rate tree for an 8% annually compounded bond (shown below). The forward rates and the corresponding values shown in this tree are based on an assumed interest rate volatility of 20%.

A member of Adams' staff has been asked to respond to the following:

Question #24 of 38

Compute V_{1L}, the value of the bond at node 1L.

A) $95.99.

B) $103.58.

C) $101.05.

Question #25 of 38

Compute V_{1U}, the value of the bond at node 1U.

A) $99.01.

B) $91.72.

C) $99.13.

Question #26 of 38

Compute V_0, the value of the bond at node 0.

A) $99.07.

B) $101.35.

C) $104.76.

Question #27 of 38

Assume that the bond is putable in one year at par ($100) and that the put will be exercised if the computed value is less than par. What is the value of the putable bond?

A) $103.04.

B) $105.17.

C) $95.38.

Question #28 of 38

Assume that the bond is putable in one year at par ($100) and that the put will be exercised if the computed value is less than par. What is the value of the put option?

A) $3.70.

B) $1.86.

C) $0.42.

Question #29 of 38

Which of the following statements regarding the option adjusted spread (OAS) for a callable bond is *least* accurate?

A) The OAS is the spread on a bond with an embedded option after the embedded option cost has been removed.

B) The OAS is equal to the Z-spread plus the option cost.

C) The OAS for a corporate bond must be calculated using a binomial interest rate model.

Question #30 of 38

Tim Brospack is generating a binomial interest rate tree assuming a volatility of 15%. Current 1-year spot rate is 5%. The 1-year forward rate in the second year is either a low estimate of 5.250% or a high estimate of 7.087%.The middle 1-year forward rate in year three is estimated at 6.25%. The lower node 1-year forward rate in year three is *closest* to:

A) 6.747%

B) 5.342%

C) 4.63%

Question #31 of 38

A 3-year, 3% annual pay, $100 par bond is valued using pathwise valuation. The interest rate paths are provided below:

Path	Year 1	Year 2	Year 3
1	2%	2.8050%	4.0787%
2	2%	2.8050%	3.0216%
3	2%	2.0780%	3.0216%
4	2%	2.0780%	2.2384%

The value of the bond in path 4 is *closest* to:

A) $100.02

B) $102.58

C) $101.88

Question #32 of 38

Sam Roit, CFA, has collected the following information on the par rate curve, spot rates, and forward rates to generate a binomial interest rate tree consistent with this data.

Maturity	Par Rate	Spot Rate
1	5%	5.000%
2	6%	6.030%
3	7%	7.097%

The binomial tree generated is shown below (one year forward rates) assuming a volatility level of 10%:

0	1	2
5%	7.7099%	C
	A	9.2625%
		B

Riot also generated another tree using the same spot rates but this time assuming a volatility level of 20% as shown below:

0	1	2
5%	8.9480%	13.8180%
	5.9980%	9.2625%
		6.2088%

The one-year forward rate represented by 'A' is closest to:

A) 6.3123%

B) 6.7732%

C) 5.4223%

Question #33 of 38

Government par curve is provided below:

Maturity (years)	Par rate
1	5.0%
2	6.0%
3	6.5%
4	7.0%

The value of a 4-year, 5% annual pay, $100 par government bond is closest to:

A) $98.49

B) $93.15

C) $101.12

Question #34 of 38

Increasing the number of paths generated in a Monte Carlo simulation is *most likely* to increase the:

A) fundamental accuracy of the estimated value.

B) utility of the model.

C) statistical accuracy of the estimated value.

Question #35 of 38

Which of the following choices is least-likely a property of a binomial interest rate tree?

A) Mean reversion of interest rates.

B) Higher volatility at higher rates.

C) Non-negative interest rates.

Question #36 of 38

Relative to the binomial model, Monte Carlo method is *most likely*:

A) less flexible in forcing interest rates to mean revert.

B) more suitable when valuing securities whose cash flows are interest rate path dependent.

C) more flexible as it does not need a volatility estimate.

Question #37 of 38

Sam Roit, CFA, has collected the following information on the par rate curve, spot rates, and forward rates to generate a binomial interest rate tree consistent with this data.

Maturity	Par Rate	Spot Rate
1	5%	5.000%
2	6%	6.030%
3	7%	7.097%

The binomial tree generated is shown below (one year forward rates) assuming a volatility level of 10%:

0	1	2
5%	7.7099%	C
	A	9.2625%
		B

Riot also generated another tree using the same spot rates but this time assuming a volatility level of 20% as shown below:

0	1	2
5%	8.9480%	13.8180%
	5.9980%	9.2625%
		6.2088%

The one-year forward rate represented by 'C' is closest to:

A) 11.3132%

B) 8.7732%

C) 7.4223%

Question #38 of 38

A 3-year, 3% annual pay, $100 par bond is valued using pathwise valuation. The interest rate paths are provided below:

Path	Year 1	Year 2	Year 3
1	2%	2.8050%	4.0787%
2	2%	2.8050%	3.0216%
3	2%	2.0780%	3.0216%
4	2%	2.0780%	2.2384%

The value of the bond in path 2 is *closest* to:

A) $101.15

B) $100.88

C) $102.72