BEGINNING OF EXAMINATION
FINANCE AND ENTERPRISE RISK MANAGEMENT; CORE SEGMENT
MORNING SESSION

Questions 1-3 pertain to the Case Study.
Each question should be answered independently.

1. *(7 points)* Zoolander Life is very concerned about being able to secure reinsurance for its term life insurance business line after January 1, 2005. Richard Scarlet, the reinsurance intermediary, has been unable to secure a replacement for Rose Re's YRT reinsurance program at a reasonable price.

As an alternative, Richard Scarlet has proposed accepting a 100% funds withheld coinsurance contract which is available from Cranberry Reinsurance Solutions. Under that arrangement, the reinsurance allowance is set at 10% of ceded premiums, and the risk charge is 1% of the outstanding surplus account for the prior year.

A simplified income statement for the term life insurance business line follows:

Zoolander Life Projected 2005 Term Life Business Line Before Reinsurance	
Premiums	
Gross	33,000,000
Ceded	0
Net Premiums	33,000,000
Investment Income	
Gross	1,650,000
Ceded	0
Net Investment Income	1,650,000
Reinsurance Allowance	0
Total Revenue	34,650,000
Claims & Surrenders	
Gross	19,000,000
Ceded	0
Net Claims & Surrenders	19,000,000
Reserve Increase	
Gross	11,000,000
Ceded	0
Net Reserve Increase	11,000,000
Total Benefits	30,000,000
Expenses & Commissions	3,500,000
Gain from Operations	1,150,000

(a) For Zoolander Life, show:

    i. the change in the income statement for 2005 under a 100% funds withheld coinsurance arrangement

    ii. the outstanding surplus account as of December 31, 2005.

(b) Explain, from Zoolander's perspective, the benefits of their existing YRT reinsurance as compared to the benefits of Cranberry's proposed arrangement.

(c) Recommend if Zoolander should purchase the reinsurance from Cranberry Re or should retain the risk. Defend your answer.

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***Each question should be answered independently*.**

2. *(11 points)* Bonnie Hawke, Zoolander Life's 2nd Vice President of Capital Planning, proposes to allocate capital by line of business using the GAAP required surplus methodology. You are given the following information.

Zoolander Life Proposed Capital Allocation		
Line of Business	**2003**	**Projected 2004**
Annuity	100.0	103.0
Disability	150.0	160.0
Life Insurance	200.0	240.0
Variable	215.0	225.0
Corporate	367.6	390.0
Total	1,032.6	1,118.0

(a) Explain why a company might choose to allocate capital by line of business.

(b) Evaluate the appropriateness of the proposed allocation method chosen by Bonnie Hawke as compared to other capital allocation methods.

(c) Using Bonnie Hawke's proposed allocation, determine whether each line of business is projected to create or destroy economic value in 2004 and whether each line of business is projected to generate free cash flow. Show your work.

(d) Explain the implications of the results in (c) above.

Questions 1-3 pertain to the Case Study.
***Each question should be answered independently*.**

3. *(11 points)* In a recent private conversation with you, Bill Buck, Zoolander's new 2nd Vice President of Enterprise Risk Management, expressed his concern about Zoolander's current compensation structure and top management's frequent absences.

He added, "I fear being caught in a situation similar to Enron or Barings. With the shareholders, Board of Directors, rating agencies and management all monitoring those companies, why wasn't anyone aware of the problems before it was too late?"

(a) *(2 points)* Identify the items in Zoolander's current compensation structure that create improper incentives and explain how they could impact the company's financials.

(b) *(1 point)* Describe the concerns a shareholder may have with the structure of Zoolander's compensation system.

(c) *(4 points)* Describe the roles that the shareholders, Board of Directors, rating agencies, and management should each play to ensure that a company does not fail.

(d) *(4 points)* Identify areas where Zoolander's shareholders, Board of Directors, rating agency and management are not meeting their obligations.

4. *(13 points)* You are the CFO for Van Halbach Airlines. Research has determined that adding routes to Nebraska would be very profitable if fuel costs remain level or drop. Financing of 100 million is needed to add the additional routes.

Assume the following:

- Only 2 scenarios exist for the next year: fuel costs remain level or they increase.
- The value of the additional routes in 1 year is 250 million if fuel costs remain level.
- The value of the additional routes in 1 year is 30 million if fuel costs increase.
- Risk-free rate is 3%.
- Cost of Equity Capital is 10%.
- Cost of Debt Capital is 6%.
- Probability that fuel costs remain level is 50%.
- Risk neutral probability that fuel costs remain level is 60%.

(a) *(4 points)* Describe advantages and disadvantages of financing the route expansion through each of the following methods:

- Equity
- Public debt
- Private debt
- Hybrid debt

(b) *(6 points)* Calculate the value to Van Halbach of the additional routes under each of the following scenarios. Show your work.

- The financing is from the issuance of common stock
- The financing is evenly split between common stock issuance and public debt
- The financing is from public debt

(c) *(2 points)* Recommend a financial structure for the route expansion based on your analysis in (a) and (b) above. Support your position.

(d) *(1 point)* Assume derivatives exist to hedge the price of fuel. Explain whether your recommendation in (c) would change. Support your position.

5. *(9 points)* You have been asked to perform an analysis of the ALM function of Murray Life. Below is information concerning the assets and liabilities of Murray Life:

Assets	**Market Value**	**Effective Duration**
Bonds	7.0	6.0
Mortgage Backed Securities	4.5	4.8
Stocks (Preferred & Common)	2.5	0.0
Mortgage Loans	1.0	7.4
Short-Term Bonds	3.0	1.0
Total	18.0	

Liabilities	**Fair Value**	**Effective Duration**
Legacy SPDA	7.0	3.5
Whole Life Insurance	3.0	8.6
Term Life Insurance	5.0	4.2
Total	15.0	

Murray Life has added a new SPDA product which is not included in the above analysis. The new SPDA has a liability fair value of 2.0 and an effective duration of 2.5. The assets backing this liability are yet to be invested. The available investment choices are limited to long-term bonds with an effective duration of 8.0 and short-term bonds with an effective duration of 1.0.

(a) *(3 points)* For each of i, ii, and iii, provide the allocation of long-term and short-term bonds which satisfy the stated ALM goal:

i. Duration matching of the new SPDA's assets and liabilities
ii. Holistic matching of the asset duration with the liability duration
iii. Holistic minimization of the effective duration of surplus

(b) *(2 points)* Describe the limitations of each of the approaches in (a).

(c) *(4 points)* Describe other ALM and non-ALM approaches to protect Murray Life against general investment risk.

6. *(5 points)* You are the Valuation Actuary of a major U.S. Life Insurance company, which offers SPDAs and term life insurance.

(a) Describe the issues involved in applying CARVM to regular deferred annuities.

(b) Describe CARVM valuation considerations associated with the product provisions often included in SPDAs.

(c) Explain how premium deficiency reserves can arise with respect to term life insurance.

(d) Prior to Regulation XXX, explain how the Unitary method could be used to avoid having to set up a deficiency reserve for term life insurance.

7. *(4 points)* An insurance company has an S&P 500 indexed liability due in one year. The investment manager is willing to assume the risk of paying the S&P 500 indexed liability up to a maximum increase of 10%.

(a) Describe a strategy using an option to limit the insurance company's payment to a maximum S&P 500 increase of 10%.

(b) Describe a strategy using an additional option to lessen the cost of the hedging strategy in (a).

(c) Create separate graphs that show:

(i) The risk profile of the S&P 500 indexed liability

(ii) The payoff profile of the option in part (a)

(iii) The payoff profile of the additional option in part (b)

(iv) The resulting net total payoff pattern to the insurance company

Ignore option costs in the graphs. Label each graph.

****END OF EXAMINATION****
MORNING SESSION

****BEGINNING OF EXAMINATION****
ENTERPRISE RISK MANAGEMENT SEGMENT
AFTERNOON SESSION
Beginning With Question 8

8. *(5 points)* You are the Chief Financial Officer for Salty Life. Salty Life's core liability products are GIC contracts. Salty Life is exploring a possible purchase of the GIC business of Tugboat Life, and you have been asked to analyze the potential deal.

Tugboat Life's December 31, 2003 GIC business has the following maturity schedule:

Liability Maturity Schedule	Amount
12/31/2004	400 million
12/31/2005	600 million
12/31/2006	750 million

The GICs have no early redemption features so the maturity cashflows as shown are fixed.

Salty Life's business model utilizes the cost-of-capital approach for evaluating business opportunities. The current assumptions used in the model are:

- Risk-free rate is 4%.
- Corporate Tax Rate is 35%.
- Credit Risk Premium on Assets is 1.25%.
- Liquidity Risk Premium is 0.15%.
- Target Risk Based Capital is 5% of Assets backing both Liabilities and Surplus.
- Target return on equity for GIC business is 12%.
- Flat term structure of interest rates.
- Expenses are zero.

(a) Describe the valuation methods which can be used to determine fair value of liabilities, and indicate which would be appropriate for valuing Tugboat's GIC business.

(b) Using Salty Life's valuation model, calculate a fair value for Tugboat Life's GIC block.

9. *(15 points)* You are the Product Actuary for Get-a-Life (GAL), a life insurance company domiciled in the United States. One year ago you created a variable annuity (VA) product to replace the Equity Indexed Annuity (EIA) product that GAL was then selling.

The VA product has a fixed income option with a guaranteed minimum interest rate of 3% and an option to invest in a segregated account that is indexed to the S&P 500. The VA liabilities have a guaranteed minimum death benefit equal to the initial deposit accumulated at the guaranteed minimum interest rate.

The table below shows pricing assumptions and actual experience to date.

t	Time 0 Pricing Assumption (S_t)	Time 1 Actual and Future Re-Estimates (S_t)
0	100	100
1	105	80
2	103	89
3	112	100
4	120	110
5	135	120

In addition, you have the following information.

	Time 0 Assumption	Time 1 Assumption
${}_1p_x$	0.995	0.993
Annual Management Expense	1.5%	1.5%
Reserve Valuation Rate	4%	4%

Your sample pricing cell assumes an initial deposit of 1,000. No future deposits are allowed and the product either annuitizes or is withdrawn at the end of five years. Death is assumed to be the only decrement before the end of year five and is assumed to occur at each year-end. Management expenses are withdrawn at year-end.

(a) *(2 points)* Describe how the risk management considerations for segregated fund contracts differ from those for EIAs.

(b) *(4 points)* Calculate the reserve for your sample pricing cell at $t = 1$ under the actual experience and compare it to the reserve from the original pricing assumptions.

9. Continued

(c) *(4 points)* Describe ways to hedge the liabilities of the VA and the practical considerations associated with each.

(d) *(2 points)* Explain the factors GAL should consider in deciding whether to hedge its VA liabilities.

(e) *(3 points)* The Chief Actuary has called a meeting to discuss first year performance of the VA product. You suspect she wants to discontinue future sales.

Outline a response which:

- supports continued sales and
- addresses any product shortcomings.

Question 10 pertains to the Case Study.

10. *(10 points)* As the new CFO of Zoolander, you have been asked to determine whether the new Enhanced Savings Annuity (ESA) product should be launched as scheduled. You have met with the product team and other executives involved with the product and have received the following additional information:

- The product will be sold to middle-income individuals.
- The product involves a complex investment and tax strategy.
- The investment strategy is to target high returns with most of the risk being borne by the individual.
- The earnings model used by the product development team indicates a high ROE based on the marketing area's projected sales volume.
- Pricing was based on estimated expenses using the same projected sales volume used in the earnings model.
- The product is expected to generate a high daily volume of transactions, which will be administered using the new Triple P system.
- Marketing materials have been developed and ordered.
- Regulations require detailed quarterly statements to be sent to each participant.
- Due to the complexity of the product there are strict disclosure requirements to prospective clients and the company must attest annually that the sales force has been properly trained.
- The tax authority has not issued clarification regarding the tax implications of this product but is expected to do so in several months.

Based on this information:

(a) (*4 points*) Identify areas of concern with the ESA product development process to date, and propose ERM best practices to address these areas of concern.

(b) (*4 points*) Determine the operational risk exposures to Zoolander associated with launching the ESA, and categorize as people, process, or technology.

(c) (*2 points*) Describe the components of an operational risk assessment report that can be used to evaluate the risks associated with this product.

11. *(5 points)* The multi-line, multi-national insurance company, Titanic Life, recently established a Risk Management Committee (RMC) upon the recommendation of its internal auditing team. The CEO of Titanic is chairing the RMC. Following the first two monthly meetings, he concluded that the meeting agendas and the RMC itself were not very fruitful, since the major risks were handled well by each respective operational unit.

As the newly hired CRO of Titanic, you have been asked to justify the continuation of the RMC.

(a) Explain the benefits of a centralized risk management function and the elements required for its successful implementation.

(b) Identify the types of risk that apply to Titanic Life as a multi-line, multi-national insurance company which would warrant a centralized risk management function.

12. *(5 points)* You are a consultant to Zambro, Inc., a BBB-rated oil and gas company. The company is run by a group of senior managers who participate in an incentive compensation program that has granted them a significant amount of stock options.

Zambro believes it has valuable information regarding future oil prices and is considering either a selective hedging strategy based on this information or a full-cover hedging strategy. As an expert in risk management you have been asked to prepare a report for senior management on hedging as a risk management tool.

(a) Explain the major costs associated with higher variability of corporate earnings and cash flow and describe how risk management can reduce each of these costs.

(b) Explain how Zambro's credit rating and compensation program could each influence the company's choice of a hedging strategy.

13. *(15 points)* Exponential Life has recently suffered excessive credit losses in its corporate bond holdings. Exponential Life has decided that its system of setting credit exposure limits is inadequate and has assigned you to explore other tools with which to better manage its credit risk position.

You have extracted the following data from commercial credit risk models:

Year (t)	Risk-free Zero Rate	1-Year Forward Credit Spreads, t Years Forward (FS_t)	Cumulative risk-neutral EDFs (Q_t)
1	3.00%	0.90%	2.00%
2	3.00%	1.26%	4.00%

(a) Using the KMV approach, determine the credit spread of a 2-year corporate bond with a face value of $100 that pays annual coupons of 5%, assuming a 40% recovery rate. Show your work.

(b) Using the Reduced-Form approach, determine the credit spread of a 2-year corporate bond with a face value of $100 that pays annual coupons of 5%, assuming a 40% recovery rate. Show your work.

(c) Contrast the underlying theory and key attributes of the KMV approach and the Reduced-Form approach to credit risk measurement.

14. *(5 points)* Your company, the International Financial Consulting Group, has been retained by Typhoon Bank, a large bank in a developing Asian country. Typhoon Bank is very concerned about its increased exposure to market risk. Furthermore, the country's Central Bank has recently announced plans to introduce the Basle Committee Accord as its new regulatory framework.

You have been assigned to produce a report for Typhoon Bank that addresses the following issues:

(a) Recommend the form and content of a market risk policy for Typhoon Bank.

(b) Describe the components of an adequate system of internal controls with respect to interest rate risk that will be expected of Typhoon Bank under a Basle management framework.

****END OF EXAMINATION****
AFTERNOON SESSION