19. (3.5 points)

A company began writing personal property and liability lines of business on January 1, 2012. The personal property line of business had the following losses at December 31, 2012:

Property Line of Business – 2012 Loss Year					
Gross Layer			Net Layer		
Paid Loss ($000s)	Incurred Loss ($000s)	Ultimate Loss ($000s)	Paid Loss ($000s)	Incurred Loss ($000s)	Ultimate Loss ($000s)
$2,000	$7,500	$10,000	$1,200	$4,500	$6,000

Notes on the property line of business:

- The claims development Margin for Adverse Deviation (MfAD) is twice as large as the reinsurance recovery MfAD.
- The company uses the same margins and payment pattern for their gross, ceded, and net reserve layers.
- The ceded claims discounted at 5% are $3,012.23.
- The net claims discounted at 5% are $4,518.35.
- The net claims discounted at 4% are $4,571.88.
- The net claim liability including margins is $5,023.72.
- The cumulative accident year payment pattern for the property line of business is as follows:

Months	Percentage paid
12	20%
24	50%
36	90%
48	100%

- Assume that all payments are made in the middle of the year.

<< QUESTION 19 CONTINUED ON NEXT PAGE >>

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(19 cont.)

Other information:

- The portfolio yield rate on the assets that are assumed to be backing all claims liabilities is 6%.
- The portfolio of investment assets contains only zero-coupon bonds maturing in 3 to 5 years with a modified duration of 3.5 years.
- The liability line of business has a 10-year assumed payment pattern with a modified duration of 6.5 years.

a. (1 point)

Identify and briefly explain two considerations that would cause the actuary to consider a discount rate other than the assumed portfolio yield rate of 6% for the liability line of business.

b. (2.5 points)

Assuming that the actuary decides that a 5% discount rate and a 1% investment return MfAD is appropriate, calculate the gross discounted claims liability, including margins, for the property line of business.

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PV Cost of capital	5,778	4,500/1.01^1=4,455	1,350/1.01^2=1,323

Estimated commuted value of claims = 496,041 + 5,778 = 501,819

Alternative to the Solution Key:
AP = Ambivalence point
Assume tax rate is 35%
AP = [AP – 0.95min(Reported Reser ves, APV)] Tax rate + PV(loss)
PV = 350K/(1.01^0.5) + 150K/(1.01^1.5) = 496,041
APV = PV (1+$MfAD_{Claims}$) = 496,041 x (1.1) = 545,645
AP = [AP – 0.95min(500K, 545,645)]x0.35 + 496,041
AP = 0.35AP – 166,250 + 496,041
AP = 507,371

b.

Sample 1:
Advantage:
- The primary insurer exchanges an uncertain future amount by a certain amount immediately.

Disadvantage:
- The primary insurer may be subject to adverse development (court award, social inflation, …)

Sample 2:
Advantage:
- The primary gets a cash flow immediately for assuming the liabilities

Disadvantage:
- The company must now hold capital in order to support the liabilities.

Sample 3 (assumes primary insurer is buyer of commutation agreement):
Advantage:
- Not subject to adverse development of loss any more

Disadvantage:
- Cash outlay, forgone some other investment opportunities

Examiner's report:
a. Many candidates attempted to use the Steeneck Ambivalence Point calculation, but not all inputs were given. These candidates were awarded partial marks.
Other common mistakes involved using 350,000 instead of 500,000 as undiscounted future payment in calculation of required capital, mis-applying the 180% regulatory capital, the 5% risk cost of capital, and the durations of 1 and 2 for the PV of risk.

b. Because the table in the question incorrectly stated that the payment was to the reinsurer, and not from the reinsurer, many candidates reversed the advantages/disadvantages listed above. These candidates were given full marks.

Question 19
Answer key:

a.
(identify any 2 of the below, and explain each)

Reinvestment Risk: Risk that the cash flows re-invested after the 3-5 year bond maturities will yield less than 6% before needed to pay out claims in years 6-10.

Liquidation of Assets (Price Risk): Risk that the required early sale of bonds in years 1-2 to cover liability cash flows would be at a loss, resulting in less than a 6% overall yield.

Investment Expenses: Portfolio yield should be reduced by expected investment expenses to reflect the net investment income expected to be earned by the insurer.

Credit Risk: Any losses expected from default should be considered in the discount rate used, and may cause it to differ from the unmodified portfolio yield.

Future Assets: Yield on assets expected to be acquired after the balance sheet date may differ from the yield on assets currently in the portfolio, which should be considered in the discount rate assumption.

Assets specifically backing liability line of business: Because the liability line of business is more long-tailed than the property line, the longer-term assets of the portflio should be considered to be backing the liabilities. The yield on those assets would differ from the overall portfolio yield of 6%.

b.

Gross Claims Liab = Gross PV + PfAD for Claims Development + PfAD for Investment Return Rate
Net Claims Liab = Net PV + PfAD for Claims Development + PfAD for Investment Return Rate + PfAD for Recovery from Reinsurance Ceded

But we do not currently know the claims development MfAD. We do have the net claims liability.
PfAD for Investment Return Rate (net) = 4,571.88 – 4,518.35 = 53.53

$5,023.72 = 4,518.35 + 53.53 + 2 * MfAD Reinsurance * 4,518.35 + MfAD Reinsurance * $3,012.23

MfAD Reinsurance = 3.75%

MfAD Claims = 2 * 3.75% = 7.5%

Gross Unpaid = 10,000 – 2,000 = 8,000

Paid in 12-24 months: (50% - 20%) / 80% = 37.5%
Paid in 24-48 months: (90% - 50%) / 80% = 50%
Paid in 36-48 months: (100% - 90%) / 80% = 12.5%

PV Gross disc @ 5% = 8,000 * 37.5% / (1.05)^0.5 + 8,000 * 50% / (1.05)^1.5 + 8000 * 12.5% / (1.05)^2.5 = 7,530.58
PV Gross disc @ 4% = 8,000 * 37.5% / (1.04)^0.5 + 8,000 * 50% / (1.04)^1.5 + 8000 * 12.5% / (1.04)^2.5 = 7,619.81

PfAD for Investment Return Rate (gross) = 7,619.81 – 7,530.58 = 89.23

Gross Claims Liab = 7,530.58 + 89.23 + 7.5% * 7,530.58 = 8,184.60

Actual candidate answer for full marks:

a.

Sample 1:

1. Mismatch in duration of assets and liabilities: the assets have a shorter durations. Therefore, actuary must consider reinvestment risk and select a slightly more conservative discount rate.
2. Credit risk: if assets present a certain risk of default, a conservative selection would be appropriate.

Sample 2:

1. Reinvestment rates – if assets and liability cash flows don't align and there is excess cash expected, consider future reinvestment rates that could be earned in this cash.
2. If there will be a need to liquidate assets because liability cash flows will be greater that assets cash flows generated by the portfolio. There could be gains/losses on the liquidation.

b.

5023.72 = 4571.88 + 2(x)(4518.35) + x(3012.23)
451.84 = 12048.93x
X=0.0375

Gross discounted liabilities incl margin
=2(0.0375)[3000/(1.05^0.5) + 4000/(1.05^1.5) + 1000/(1.05^2.5)] + 3000/(1.04^0.5) + 4000/(1.04^1.5) + 1000/(1.04^2.5)]
=2(0.0375)(7530.59) + 7619.81
=564.79 + 7619.81
=8184.6

Examiner's report:

a. Many considerations given by candidates were considerations for the interest MfAD instead of considerations for the discount rate. Another common error was to consider using a different discount rate for ceded, net or gross layers, when the question states that the assets are backing all claims liabilities.
b. Generally, candidates did well on this part. Some errors included accidentally calculating the reinsurance recovery MfAD as twice the claims development MfAD, or calculating the claims PfAD as twice the reinsurance recovery PfAD.

Question 20

Answer key:

a.