(6.75 points) An insured is deciding between purchasing a large deductible plan or a retrospective rating plan. The following information is provided:

Expected Annual Loss Amount Before Modification	$339,232
Annual Loss Trend Rate	4%
Limited LDF to Ultimate (18-Ult)	1.455
Limited LDF to Ultimate (30-Ult)	1.213
Limited LDF to Ultimate (42-Ult)	1.103
Excess Ratio @ $100,000	0.720
Actual Losses Capped @ $100,000 - 2nd prior policy period	$73,769
Actual Losses Capped @ $100,000 - 3rd prior policy period	$53,417
Actual Losses Capped @ $100,000 - 4th prior policy period	$44,783
Z (Credibility)	80%
Loss Adjustment Expenses as a Percentage of Loss	10%
Premium Tax as a Percentage of Premium	2%
Commission as a Percentage of Premium	12%
Fixed Overhead Expenses	$25,000
Underwriting Profit as a Percentage of Excess Loss	8%
Per Occurrence Deductible	$100,000
Aggregate Deductible Limit	None
Maximum Ratable Loss	None
Minimum Ratable Loss	None

The experience modification is based on three years of reported losses with individual claims capped at $100,000.

a. (2.5 points) Calculate the experience modified expected losses for the account.

b. (1.5 points) Calculate the premium under a large deductible plan for the account.

c. (1.75 points) Calculate the premium under a retrospective rating plan for the account.

d. (1 point) Describe two reasons why the insured might choose the policy with the higher premium.

(a) Assume that this is intended to be something similar to the ISO Experience Rating Plan.
Assume that the experience rating plan uses losses without ALAE.
Assume that the trend period from the 2nd prior policy to the policy effective period is 2 years, as would be usually be the case.

Then the detrend factors are: $1/1.04^2 = 0.925$, 1.04^3, and 1.04^4.

The expected percents unreported are: 1 - 1/1.455, 1 - 1/1.213, 1 - 1/1.103 = 0.093.

	Expected Losses	One minus Excess Ratio	Detrend Factor	Expected Losses	Percent Unreported	Expected Unreported
2nd prior	$339,232	0.280	0.925	$87,819	0.313	$27,462
3rd prior	$339,232	0.280	0.889	$84,441	0.176	$14,828
4th prior	$339,232	0.280	0.855	$81,194	0.093	$7,582
				$253,454		$49,872

For example: ($339,232)(0.280)(0.925) = $87,819. ($87,819)(0.313) = $27,462.
Actual reported losses (capped) are: $73,769 + $53,417 + $44,783 = $171,969.

Experience Mod = $0.80 \frac{171,969 + 49,872}{253,454} + (1 - 0.80) = 0.900$.

The experience modified expected losses for the account are: (0.900)($339,232) = **$305,309**.
Alternately, instead we can adjust each year to the maturity level of the reported data.
(This is what is done in the Case Study of "Individual Risk Rating".)
$87,819/1.455 = $60,357. $84,441/1.213 = $69,613. $81,194/1.103 = $73,612.
Thus the expected reported (immature) capped losses are:
$60,357 + $69,613 + $73,612 = $203,581.
Comparing the reported losses to this expected amount, the experience modification is:
(0.80)($171,969/$203,581) + 0.20 = 0.876.
The experience modified expected losses for the account are: (0.876)($339,232) = **$297,167**.

(b) Assume the large deductible applies to losses without ALAE.
Start with experience modified expected losses from part (a): $305,309.
Since insurer handles all claims, expected LAE is: (10%)($305,309) = $30,531.
Expected excess losses: (0.720)($305,309) = $219,822.
Provision for underwriting profit: (8%)($219,822) = $17,586.
Adding in the fixed expenses and loading for variable expenses (commissions and taxes),

the premium is: $\frac{\$219,822 + \$30,531 + \$17,586 + \$25,000}{1 - 0.02 - 0.12}$ = **$340,417**.

Alternately, use experience modified expected losses from part (a) of $297,167.
Then the premium is:

$$\frac{(0.72)(297,167) + (10\%)(297,167) + (8\%)(0.72)(297,167) + \$25,000}{1 - 0.02 - 0.12} = \textbf{\$332,318}.$$

(c) Assume the retro plan applies to losses without ALAE, and has a $100,000 per occurrence limit.
Let us include commissions in the tax multiplier, since they are a percent of premiums.
(The commission rate would normally vary by size of insured and in the NCCI Retro plan would normally be part of the expenses included in the basic premium.)
Thus the tax multiplier is: 1 / (1 - 0.02 - 0.12) = 1/0.86.
Since there is no maximum or minimum premium, there is no net insurance charge.
I will use experience modified expected losses from part (a) of $305,309.
There is $25,000 of fixed expenses plus $17,586 for the underwriting profit provision, both to be included in the basic premium.
We need to include a charge for the expected excess losses plus associated LAE:
(1.1) ($219,822) = $241,804.
Let L* be the reported losses for the retro policy, limited by the per $100,000 occurrence limit.
(The value can vary at each of many adjustments.) Then the retro premium is:
(1.1 L* + 25,000 + 17,586 + 241,804) / 0.86 = **(1.1L* + 284,390) / 0.86**.
Alternately, we have the answer provided by the CAS, which ignores the fundamental fact that retro premiums vary with the reported losses for the policy being retro rated.
I will again use experience modified expected losses from part (a) of $305,309.
Since there is no maximum or minimum premium, there is no net insurance charge.
Loss Conversion Factor is: 1 + 0.10 = 1.10
Tax Multiplier is: 1/ (1 - 0.12 - 0.02) = 1.163
Basic Premium (including charge for occurrence limit) is:
Expenses + UW Profit + Converted Excess Losses =
$25,000 + (0.08)($219,822) + (1.1)($219,822) = $284,390.
Expected Losses below per occurrence limit: (1 - 0.720)($305,309) = $85,486.
Including these expected primary losses, multiplied by the loss conversion factor, the retro premium would be: (1.163) {$284,390 + ($85,486)(1.10)} = $440,108.
The CAS has calculated a retro premium assuming that the expected losses occur.

(d) Assume that the initial premium the insured would be charged if they chose a retro is higher than the premium for the large deductible policy. Then there would be cashflow advantages to the insured with the LDD. (This could be complicated by the fact that loss reimbursements under the LDD are probably billed quarterly, while the retro adjustments take place yearly starting 18 months from policy inception.)

The answers provided by the CAS (See my comment):

If candidate calculates that LDD premium is higher than Retro premium:

1) A company might be willing to pay more for the certainty of a fixed premium amount.

2) The insured may not have the capability to handle and process claims and may wish the insurance company to do that work which is what happens with a LDD policy.

If candidate calculates that the Retro premium is higher than the LDD premium:

1) The insured may have made changes to their safety procedures, meaning that they would have lower losses in future periods, and the higher retrospective premium will eventually adjust downward, saving the company money

2) The insured may be in the type of business that generates a large number of very small losses, so a large deductible policy would require the insured to pay most of their losses.

Comment: One will get somewhat different answers to later parts, based on your answer to part (a).
The Insurer faces more credit risk writing an LDD compared to an (incurred loss) retro. Thus for certain insureds the insurer may not be willing to write an LDD without collateral posted by the insured.
Also, for an LDD there is less premium reported in the Annual Statement than for an otherwise similar retro plan. Thus for an LDD the amount of premium tax paid by the insurer is lower. Also for Workers Compensation insurance, the insurer will (usually) face less of an assessment to support the residual market. The insurer may include more to help pay this assessment in an retro than in an LDD. Because of these reasons, the insured's expected cost is generally somewhat lower under a large deductible plan than the expected premium for an otherwise similar retro plan.
It makes no sense to compare the retro premium to the LDD premium ignoring loss reimbursements, thus part (d) is a defective question.
Even so, the CAS answers to part (d) are not correct.
If the LDD premium were higher than the retro premium, then the insured would pay more total under the LDD than the retro, when one includes loss reimbursements that the insured would have to pay the insurer. In any case, under an LDD while the premium is fixed the amount of loss reimbursements varies. Also while under an LDD the insurer handles all claims, the same is true for a retro, thus this provides no reason to choose one option over the other.
If the insured has made changes to their safety procedures, meaning that they would have lower losses in future periods, then the higher retrospective premium will eventually adjust downward, saving the insured money; however, under an LDD the loss reimbursements will be lower to the same extent, saving the insured the same money.
If the insured is in the type of business that generates a large number of very small losses, a large deductible policy would require the insured to pay most of their losses via loss reimbursements; however, their (expected) retro premium would similarly be higher as we expect most of the reported losses to be below the occurrence limit and thus enter the retro calculation.
In general, if the excess ratio used by the insurer to price either a retro or LDD is not appropriate for the given insured, then the retro or LDD will be mispriced.
In this case, if the (expected) excess ratio at $100,000 for this insured were 0.4 rather than 0.72, but the total expected losses were correct, then the calculated retro and LDD would both be too high for this insured. (One could not accurately estimate the excess ratio for a single insured of this size.)