1. The Freebourn Stop Loss Insurance Company uses the Expected Loss Ratio Method to set reserves for its stop loss business. During 2020, Freebourn had earned premium of 1,400,000 and paid claims of 250,000. Freebourn expects a loss ratio of 55%.

   Determine the reserve that Freebourn should hold at December 31, 2020.

2. During the first quarter of 2020, The Miller Insurance Company collect the following premium amounts:

Month	January	February	March
Premium Collected	120,000	150,000	180,000

   All premiums are paid on the first day of the month and all premiums are annual premiums.

   Calculate the earned premium by Miller during the first quarter of 2020.

3. You are given the following Paid Claims triangle:

Incremental Loss Payments by Development Year				
Accident	Development Year			
Year	0	1	2	3
2016	15,000	10,000	4,000	2,000
2017	20,000	18,000	6,000	
2018	25,000	12,000		
2019	30,000			

   There is no further development after year 3.

   a. Calculate the loss reserve on December 31, 2019 using the chain ladder method with arithmetic average loss development factors.

   b. Calculate the loss reserve on December 31, 2019 using the chain ladder method with volume weighted average loss development factors.

   c. What is the total amount of claims paid in 2019?

   d. If the earned premium for 2016 was 50,000, calculate the loss ratio for 2016.

4. The following table shows the link ratios for cumulative payments based on the chain ladder method:

Development Years	Link Ratio
1/0	2.00
2/1	1.25
3/2	1.10
4/3	1.05

There is no further development after four years.

The following table shows the total amount of claims paid through the end of December 2019:

Accident Year	Cumulative Claim Payment Through 12/31/2019
2016	10,000
2017	8000
2018	6000
2019	4000

Calculate the reserve using the chain ladder method for December 31, 2019.

5. The following table shows the link ratios for cumulative payments based on the chain ladder method:

Development Years	Link Ratio
1/0	2.00
2/1	1.25
3/2	1.10
4/3	1.05

There is no further development after four years.

For accident year 2018, the earned premium was 100,000. The expected loss ratio was 0.70. The claims paid during 2018 and 2019 totaled 50,000.

For the claims from accident year 2018, determine the reserves using:

a. The Loss Ratio method

b. The claim ladder method

c. The Bornhuetter-Ferguson method

6. You are given the following information:

Accident Year	Earned Premium	Expected Loss Ratio	Cumulative Loss Payments through Development Month			
			12	24	36	48
AY5	19,000	0.90	4,850	9,700	14,100	16,200
AY6	20,000	0.85	5,150	10,300	14,900	
AY7	21,000	0.91	5,400	10,800		
AY8	22,000	0.88	7,200			

There is no development past 48 months.

Calculate the actuarial reserve using the Bornhuetter-Ferguson method and volume weighted average loss development factors.

7. You are given the following information for a given accident year for a block of business with case reserves:

     i. Earned Premium = 1,000,000

     ii. Expected Loss Ratio = 75%

     iii. Claims paid to date = 450,000

     iv. Case Reserves = 250,000

     v. $f_{Ult} = 1.15$

Find the Total Actuarial Reserve using:

    a. The Loss Ratio Method

    b. The Chain Ladder Method

    c. The Bornhuetter-Ferguson Method

8. Below is the reserve development from Table 3.5:

Table 3.5

**Estimated Paid Losses and Loss Reserves by Accident Year,
Based on 5-Year Average Paid Loss Development Factors Derived in Table 3.3**

Accident Year	Development Year							Estimated Ultimate Losses	Paid-To-Date	Estimated Loss Reserve
	1	2	3	4	5	6	7			
AY1								14,032	14,032	0
AY2							14,197	14,197	14,015	182
AY3						18,031	18,266	18,266	17,506	760
AY4					22,614	23,293	23,595	23,595	21,599	1,996
AY5				25,948	27,167	27,982	28,346	28,346	23,827	4,519
AY6			24,979	27,202	28,481	29,335	29,716	29,716	21,478	8,238
AY7		27,282	31,729	34,553	36,177	37,262	37,747	37,747	22,253	15,494
AY8	24,851	30,467	35,433	38,586	40,400	41,612	42,153	42,153	15,162	26,991
TOTAL								208,052	149,872	58,180

Using an annual effective interest rate of 6% and assuming future loss payments are made in the middle of the year, calculate the discounted reserve using the values in Table 3.5.

Answers:

1. 520,000

2. 70,000

3.
   a. 44,395
   b. 43,796
   c. 50,000

4. 11,952.50

5.
   a. 20,000
   b. 22,187.50
   c. 21,515.15

6. 23,391.22

7.
   a. 300,000
   b. 355,000
   c. 347,826

8. 52,318