1. During 2019, The Jordan Stop Loss Insurance Company collect the following premium amounts:

Month	January	April	July	October
Premium Collected	1,000,000	960,000	780,000	800,000

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

Hayley, the company's actuary, expected a loss ratio of 62.5%.

During 2019, the company paid losses for claims incurred in 2019 of 1,100,000.

Use the loss ratio method to determine the reserves that should be held on December 31, 2019.

Solution:

The premium for January was collected on January 1 and was for a whole year (12 months). The whole year has passed so we have earned the entire premium of 1,000,000.

Since the premium for April was collected on April 1 and was for a whole year (12 months), we have earned 9 months of the premium as 9 months have passed since April 1.

$$\text{Earned Premium} = (960,000)\left(\frac{9}{12}\right) = 720,000.$$

Since the premium for July was collected on July 1 and was for a whole year (12 months), we have earned 6 month of the premium as 6 month has passed since July 1.

$$\text{Earned Premium} = (780,000)\left(\frac{6}{12}\right) = 390,000.$$

Since the premium for October was collected on October 1 and was for a whole year (12 months), we have earned 3 month of the premium as 3 month has passed since October 1.

$$\text{Earned Premium} = (800,000)\left(\frac{3}{12}\right) = 200,000.$$

Total Earned Premium $= 1,000,000 + 720,000 + 390,000 + 200,000 = 2,310,000$

Expected total losses $= (2,310,000)(0.625)=1,443,750$

Reserve $=$ Expected total losses $-$ Claims Already Paid $=1,443,750 - 1,100,000 = 343,750$

2. You are given the following Paid Claims triangle:

Cumulative Loss Payments by Development Year					
Accident	Development Year				
Year	0	1	2	3	4
2015	50,000	125,000	145,000	155,000	157,500
2016	70,000	170,000	200,000	212,000	
2017	90,000	210,000	250,000		
2018	100,000	235,000			
2019	125,000				

There is no further development after year 4.

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

Solution:

$$f(1/0) = \frac{125,000 + 170,000 + 210,000 + 235,000}{50,000 + 70,000 + 90,000 + 100,000} = 2.3871$$

$$f(2/1) = \frac{145,000 + 200,000 + 250,000}{125,000 + 170,000 + 210,000} = 1.1782$$

$$f(3/2) = \frac{155,000 + 212,000}{145,000 + 200,000} = 1.0638$$

$$f(4/3) = \frac{157,500}{155,000} = 1.0161$$

$$f(5/4) = 1$$

AY Reserve = (Claims Paid To Date)(f_{Ult}) − Claims Paid To Date

2015 AY Reserve = (157,500)(1) − 157,500 = 0

2016 AY Reserve = (212,000)(1)(1.0161) − 212,000 = 3413

2017 AY Reserve = (250,000)(1)(1.0161)(1.0638) − 250,000 = 20,232

2018 AY Reserve = (235,000)(1)(1.0161)(1.0638)(1.1782) − 235,000 = 64,284

2019 AY Reserve = (125,000)(1)(1.0161)(1.0638)(1.1782)(2.3871) − 125,000 = 255,011

Reserve = 3413 + 20,232 + 64,284 + 255,011 = 342,940