STAT 479
Fall 2022
Quiz 6

November 29, 2022

1. You are setting rates for a short term insurance product. You are given the following data:

Calendar Year	Earned Premium
2019	4800
2020	7200
2021	9600

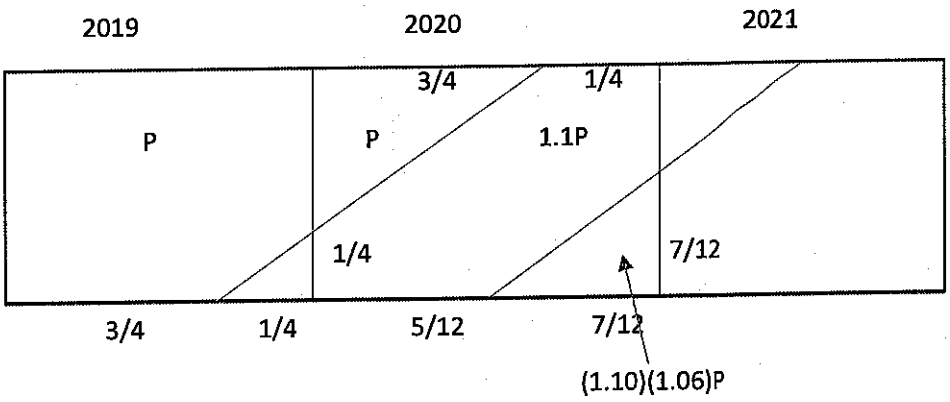
Assume that all policies are one year policies and the policies are issued uniformly throughout the year.

The following rate changes have occurred:

Date	Rate Change
October 1, 2019	10%
June 1, 2020	6%

Using the parallelogram method, calculate the earned premium for 2020 based on current rates.

Solution:



2020

$$\text{Weighted Premium} = \left[\frac{\left(\frac{3}{4}\right)\left(\frac{3}{4}\right)}{2}\right]P + \left[\frac{\left(\frac{7}{12}\right)\left(\frac{7}{12}\right)}{2}\right](1.1)(1.06)P$$

$$+\left\{1-\left[\frac{\left(\frac{3}{4}\right)\left(\frac{3}{4}\right)}{2}\right]-\left[\frac{\left(\frac{7}{12}\right)\left(\frac{7}{12}\right)}{2}\right]\right\}(1.1)P = 1.0831P$$

$$\text{Current Rate Earned Premium} = (7200)\left(\frac{(1.06)(1.10)}{1.0831}\right) = 7751.08$$

2. You are setting rates for the time period of February 1, 2021 to November 1, 2021.

You are given the following data:

Rate Making Data			
Accident Year	**Earned Exposure Units**	**Ultimate Losses (Fully Developed)**	**Number of Incurred Claims**
2015	500,000	96,030,000	30,000
2016	550,000	114,296,875	34,375
2017	600,000	122,276,400	37,200
2018	650,000	142,233,650	41,275
2019	700,000	157,525,200	44,100

You want to use this data to project loss costs with trend to the midpoint of the of the rate making period.

You determine that the least squares line fitting the natural log of the loss cost is:

$$Y = 5.2695 + 0.03685X$$

Use this equation to project the loss cost to the midpoint of the rate making period.

Solution:

The midpoint for the rate period of February 1, 2021 to November 1, 2021 is ~~May~~ JUNE 15, 2021. The midpoint for accident year 2015 is July 1, 2015. The difference is 5 11.5/12.

$$Y = 5.2695 + 0.03685(5\ 11.5/12) = 5.489065$$

$$\text{Trended Loss Cost} = e^{5.489065} = 242.03$$