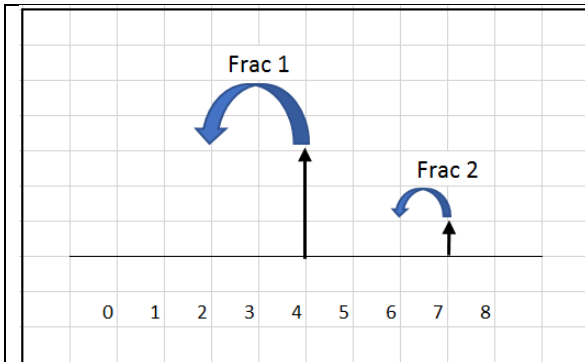


Quiz 3

50 Points (Time: 35:00 Minutes)

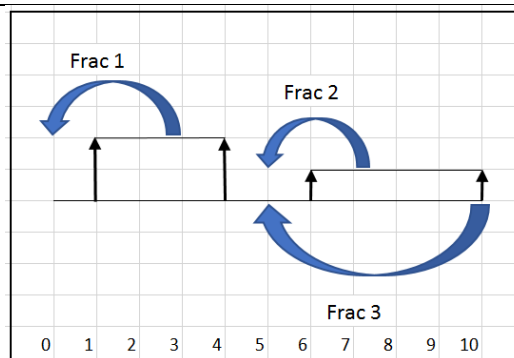
Question 1: (20 points)

In the diagrams below, Frac refers to an appropriate value of one of the factors used to find present, future, or equal annual payments (such as (P/F, I, n), (A/P, I, n), (P/G, I, n), and so on). For each separate cash flow, write any relationship that might exist between the factors in terms of less than, greater than or equal. If no relationship exists, write “No Relationship”



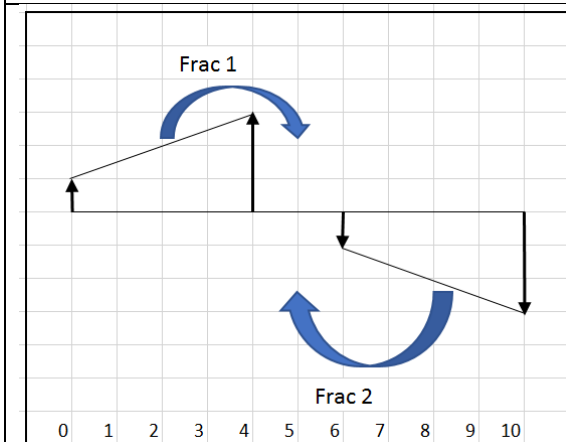
Cash flow 1

Frac1: (P/F, I, 2) Frac2: (P/F, I, 1)
 $Frac1 = (Frac2)^2$
 $Frac1 < Frac2 < 1$



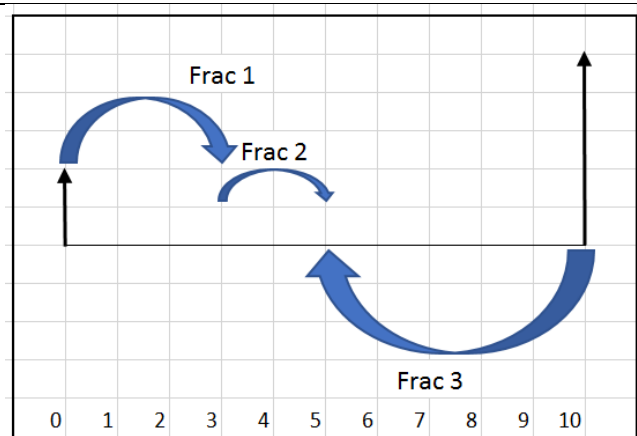
Cash flow 2

Frac1: (P/A, I, 4) Frac2: (P/A, I, 5)
 Frac3: (P/F, I, 5)
 $Frac2 > Frac1 > Frac3$
 $Frac2 - Frac3 = Frac1$



Cash flow 3

$Frac1 > Frac2$
 No other relationship can be deduced from given Fracs.



Cash flow 4

$Frac3 = 1/(Frac1 * Frac2)$
 $Frac3 < 1$ $Frac1 > 1$ $Frac2 > 1$
 $Frac1 > Frac2 > Frac3$

Question 2: (30 points)

Below is the table of transactions for a 30 year project with $i\%$ interest rate and annual compounding. You are instructed to find the equivalence of this cash flow at the end of year 2015 (same as beginning of year 2016). Furthermore, the following restrictions apply:

1. No use of Internet, EXCEL or programmable calculators
2. No combining of transactions before the end of calculations
3. No use of (P/F, I, n) for payments that are considered as part of a structured series.

Without solving the problem, layout a plan to find the answer. Do not use general sentences. Be specific. For example, if you see an arithmetic series between years 5 and 9 and intend to find its present worth at year 0, you need to write the statement that would accomplish that instead of saying you want to do that.

Year	Transactions 1	Transactions 2	Transactions 3	Transactions 4
2000	-654239			
2001			2300	
2002			2380	
2003		8200	2460	
2004		8200	2540	-300.00
2005		8200	2620	-360.00
2006	-41000	8200		-432.00
2007		8200	2780	-518.40
2008		8200	2860	-622.08
2009	12000	8200	2940	-746.50
2010		8200	3020	-895.80
2011		8200	3100	-1074.95
2012		8200	3180	
2013	-63421		3260	1000.00
2014		8200	3190	1100.00
2015		8200	3120	1210.00
2016		8200	3050	1331.00
2017		8200	2980	1464.10
2018	15000	8200	2910	1610.51
2019		8200	2840	1771.56
2020		8200	2770	1948.72
2021		8200	2700	2143.59
2022	-71068		2630	2357.95
2023		8200	2560	2593.74
2024		8200	2490	2853.12
2025		8200	2420	3138.43
2026		1500	2350	3452.27
2027	21000	1500		
2028		1500		
2029	32500	1500		

Year	Transactions 1	Transactions 2	Transactions 3	Transactions 4
2000	0	-654239		
2001	1		2300	
2002	2		2380	
2003	3	8200	2460	
2004	4	8200	2540	-300.00
2005	5	8200	2620	-360.00
2006	6	-2700-41000	2700	-432.00
2007	7		2780	-518.40
2008	8		2860	-622.08
2009	9	12000	2940	-746.50
2010	10		3020	-895.80
2011	11		3100	-1074.95
2012	12		3180	
2013	13	-8200-63421	8200	1000.00
2014	14		8200	1100.00
2015	15		8200	1210.00
2016	16		8200	1331.00
2017	17		8200	1464.10
2018	18	15000	8200	1610.51
2019	19		8200	1771.56
2020	20		8200	1948.72
2021	21		8200	2143.59
2022	22	-8200-71068	8200	2357.95
2023	23		8200	2593.74
2024	24		8200	2490
2025	25		8200	3138.43
2026	26		1500	3452.27
2027	27	21000	1500	
2028	28		1500	
2029	29	32500	1500	

Solution Approach:

1. renumber years from 0 to 29. Then try to find the present worth of all transactions at year 0 then find its future equivalence at year 15.

Transactions 2:

- at years 13 and 22, complete annual payments of Transactions 2 by adding 8200 and subtracting it from transactions 1 for the same years.
- find PW of equal annual payments of 8200 for 23 periods by $8200(P/A, i, 23)(P/F, i, 2)$
- find PW of equal annual payments of 1500 for 4 periods by $1500(P/A, i, 4)(P/F, i, 25)$
- $PW(\text{Transaction 2}) = PW \text{ value from step 3} + PW \text{ value from step 4}$

Transactions 3:

- looks like an arithmetic gradient series ($A=2300, G=80$) from year 1 to year 13 with one missing element at year 6. Add the missing element and subtract it from Transaction 1 of the same year. Now calculate PW by $2300(P/A, i, 13)+80(P/G, i, 13)$
- There is another arithmetic gradient series ($A=3190, G=-70$) from year 14 to year 26 in Transactions 3. PW can be calculated by $[3190(P/A, i, 12)-70(P/G, i, 12)](P/F, i, 13)$
- $PW(\text{Transaction 3}) = PW \text{ value from step 6} + PW \text{ value from step 7}$

Transactions 4:

- a geometric gradient series ($A1=-300, g=20\%, n=8$) from year 4 to year 11, and another one from year 13 to year 26 ($A1=1000, g=10\%, n=14$) exist in Transaction 4. Use formula to calculate present worth at year 3 for first series then multiply by $(P/F, i, 3)$. Add the two values to get the PW for Transactions 4.

Transactions 1:

- there are 10 individual transaction in that group that we need to find their present worth individually by using $(P/F, i, n)$ for different n values (0, 6, 9, 13, 18, 22, 27, and 29).
- Add all present worths calculated for all transactions and then use $(F/P, i, 15)$ to find the equivalence at year 15.