Eryk Walter 151931, Eryk Ptaszyński 151950

2.1:

Our model successfully finds subsets of conflict-free constraints and solves the uta problem for them $\ensuremath{\mathsf{S}}$

2.2:

Ranking for the largest set of consistent preference information:

Countries	Utility	Rank
India	0.509122	1.0
Ukraine	0.33174	2.0
Belarus	0.326464	3.0
Moldova	0.313598	4.0
Brazil	0.296359	5.0
Hungary	0.286929	6.0
Tunisia	0.265539	7.0
Mongolia	0.264306	8.0
Armenia	0.258263	9.0
Ethiopia	0.250008	10.0
Indonesia	0.250005	11.0
Romania	0.250003	12.0
Argentina	0.250002	13.0
Turkey	0.250002	14.0
Georgia	0.250001	15.0
Angola	0.25	16.0
Greece	0.25	17.0
Madagascar	0.249999	18.0
Mozambique	0.249999	19.0
Guatemala	0.249998	20.0
	-	

Countries	Utility	Rank
Namibia	0.249997	21.0
Colombia	0.249997	22.0
Mexico	0.249997	23.0
Serbia	0.249996	24.0
Honduras	0.249996	25.0
Paraguay	0.249995	26.0
Philippines	0.249995	27.0
Peru	0.249995	28.0
Chile	0.249995	29.0
Panama	0.249992	30.0
Slovenia	0.249991	31.0
Costa Rica	0.240379	32.0
Spain	0.236559	33.0
El Salvador	0.236384	34.0
Tanzania	0.210263	35.0
Uganda	0.202983	36.0
South Africa	0.202506	37.0
Portugal	0.166676	38.0
Thailand	0.083341	39.0

We didn't expect India to rank so high

```
_C7: - Gross_Domestic_Product_4827.39 + Gross_Domestic_Product_6427.67 >= 0
_C8: Unemployment_Rate_1.18 = 0
_C9: Unemployment_Rate_0.04 <= 0.5
_C11: Unemployment_Rate_0.04 - Unemployment_Rate_0.32 >= 0
_C12: Unemployment_Rate_0.32 - Unemployment_Rate_0.61 >= 0
_C13: Unemployment_Rate_0.61 - Unemployment_Rate_0.89 >= 0
_C14: Unemployment_Rate_0.89 - Unemployment_Rate_1.18 >= 0
_C15: Income_Tax_Rate_49.00 = 0
_C16: Income_Tax_Rate_11.80 <= 0.5
_C17: Income_Tax_Rate_11.80 >= 0.0833333333333333
_C18: Income_Tax_Rate_11.80 - Income_Tax_Rate_21.10 >= 0
_C19: Income_Tax_Rate_21.10 - Income_Tax_Rate_30.40 >= 0
_C20: Income_Tax_Rate_30.40 - Income_Tax_Rate_39.70 >= 0
_C21: Income_Tax_Rate_39.70 - Income_Tax_Rate_49.00 >= 0
C22: Inflation 3.27 = 0
_C23: Inflation_0.02 <= 0.5
_C24: Inflation_0.02 >= 0.083333333333333
C25: Inflation 0.02 - Inflation 0.83 >= 0
_C26: Inflation_0.83 - Inflation_1.64 >= 0
_C27: Inflation_1.64 - Inflation_2.46 >= 0
_C28: Inflation_2.46 - Inflation_3.27 >= 0
_C29: Total_Reserves_978295594.10 = 0
_C30: Total_Reserves_445435000000.00 <= 0.5
_C31: Total_Reserves_445435000000.00 >= 0.0833333333333
_C32: Total_Reserves_112092471695.58 - Total_Reserves_978295594.10 >= 0
C33: - Total Reserves 112092471695.58 + Total Reserves 223206647797.05 >= 0
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_C34: - Total_Reserves_223206647797.05 + Total_Reserves_334320823898.53 >= 0
_C35: - Total_Reserves_334320823898.53 + Total_Reserves_445435000000.00 >= 0
_{C36}: GINI_{63.00} = 0
C37: GINI 25.09 <= 0.5
_C38: GINI_25.09 >= 0.08333333333333
_C39: GINI_25.09 - GINI_34.57 >= 0
_C40: GINI_34.57 - GINI_44.04 >= 0
_C41: GINI_44.04 - GINI_53.52 >= 0
C42: GINI_53.52 - GINI_63.00 >= 0
_C43: GINI_25.09 + Gross_Domestic_Product_6427.67 + Income_Tax_Rate_11.80
+ Inflation_0.02 + Total_Reserves_445435000000.00 + Unemployment_Rate_0.04
_C44: Colombia_P_Serbia - 0.625879249784 GINI_34.57
 - 0.197684642327 GINI_44.04 + 0.823563892111 GINI_53.52
+ 0.335100851519 Gross_Domestic_Product_1626.84
 - 0.335100851519 Gross_Domestic_Product_26.57
 - 0.827956989247 Income_Tax_Rate_11.80 - 0.172043010753 Income_Tax_Rate_21.10
+ 0.33333333333 Income_Tax_Rate_30.40 + 0.666666666667 Income_Tax_Rate_39.70
+ 0.563798425461 Inflation_0.02 - 0.563798425461 Inflation_0.83
+ 0.333411362112 Total Reserves 112092471695.58
 - 0.333411362112 Total Reserves 978295594.10
 - 0.00491547936211 Unemployment_Rate_0.04
+ 0.00491547936211 Unemployment_Rate_0.32 >= 1e-06
_C45: - 0.33543376355 GINI_34.57 + 0.33543376355 GINI_44.04
 - 0.00233422256544 Gross_Domestic_Product_1626.84
+ 0.00233422256544 Gross Domestic Product 26.57
+ 0.827956989247 Income_Tax_Rate_11.80 + 0.172043010753 Income_Tax_Rate_21.10
 - 0.698924731183 Income_Tax_Rate_30.40 - 0.301075268817 Income_Tax_Rate_39.70
 - 0.047274048863 Inflation 0.02 + 0.047274048863 Inflation 0.83
 + Serbia P Greece + 0.0439888766627 Total Reserves 112092471695.58
 - 0.0439888766627 Total Reserves 978295594.10
 - 0.0568748600908 Unemployment Rate 0.04
+ 0.0568748600908 Unemployment Rate 0.32 >= 1e-06
_C46: 0.961313013334 GINI_34.57 - 0.137749121223 GINI_44.04
 - 0.823563892111 GINI_53.52 + Greece_P_Colombia
 - 0.332766628953 Gross_Domestic_Product_1626.84
+ 0.332766628953 Gross_Domestic_Product_26.57
+ 0.365591397849 Income_Tax_Rate_30.40 - 0.365591397849 Income_Tax_Rate_39.70
 - 0.516524376598 Inflation_0.02 + 0.516524376598 Inflation_0.83
 - 0.377400238775 Total_Reserves_112092471695.58
 + 0.377400238775 Total Reserves 978295594.10
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+ 0.0617903394529 Unemployment_Rate_0.04
 - 0.0617903394529 Unemployment_Rate_0.32 >= 1e-06
_C47: Colombia_P_Argentina - 0.239155920113 GINI_34.57
 - 0.584407971998 GINI 44.04 + 0.823563892111 GINI 53.52
 - 0.106979930991 Gross_Domestic_Product_1626.84
 + 0.106979930991 Gross_Domestic_Product_26.57
 - 0.172043010753 Income_Tax_Rate_30.40 + 0.172043010753 Income_Tax_Rate_39.70
 - 0.263580914806 Inflation_0.02 + 0.263580914806 Inflation_0.83
 + 0.0145975187137 Total_Reserves_112092471695.58
 - 0.0145975187137 Total_Reserves_978295594.10
 + 0.0486496898959 Unemployment_Rate_0.04
 - 0.0486496898959 Unemployment_Rate_0.32 >= 1e-06
C48: Argentina P Guatemala + 0.239155920113 GINI 34.57
 + 0.209847596841 GINI_44.04 - 0.449003516953 GINI_53.52
 + 0.52306369555 Gross_Domestic_Product_1626.84
 - 0.52306369555 Gross Domestic Product 26.57
 - 0.0645161290323 Income_Tax_Rate_21.10
 - 0.430107526882 Income_Tax_Rate_30.40 + 0.494623655914 Income_Tax_Rate_39.70
 + 0.183628891393 Inflation_0.02 - 0.183628891393 Inflation_0.83
 + 0.319466468631 Total_Reserves_112092471695.58
 - 0.319466468631 Total_Reserves_978295594.10
 + 0.56830187205 Unemployment_Rate_0.04 - 0.56830187205 Unemployment_Rate_0.32
 >= 1e-06
_C49: 0.374560375158 GINI_44.04 - 0.374560375158 GINI_53.52
 - 0.416083764558 Gross_Domestic_Product_1626.84
 + 0.416083764558 Gross_Domestic_Product_26.57 + Guatemala_P_Colombia
 + 0.0645161290323 Income_Tax_Rate_21.10
 + 0.602150537634 Income_Tax_Rate_30.40 - 0.66666666667 Income_Tax_Rate_39.70
 + 0.0799520234135 Inflation_0.02 - 0.0799520234135 Inflation_0.83
 - 0.334063987345 Total_Reserves_112092471695.58
 + 0.334063987345 Total_Reserves_978295594.10
 - 0.616951561946 Unemployment Rate 0.04
 + 0.616951561946 Unemployment_Rate_0.32 >= 1e-06
_C50: Colombia_P_Argentina + Serbia_P_Greece <= 1
_C51: Colombia_P_Argentina + Serbia_P_Greece <= 1
_C52: Colombia_P_Argentina + Colombia_P_Serbia <= 1
C53: Colombia P Argentina + Serbia P Greece <= 1
_C54: Colombia_P_Argentina + Colombia_P_Serbia <= 1
_C55: Colombia_P_Argentina + Greece_P_Colombia <= 1
_C56: Colombia_P_Argentina + Serbia_P_Greece <= 1
_C57: Colombia_P_Argentina + Colombia_P_Serbia <= 1</pre>
C58: Colombia P Argentina + Greece P Colombia <= 1
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_C59: Colombia_P_Serbia + Guatemala_P_Colombia <= 1
_C60: Colombia_P_Argentina + Serbia_P_Greece <= 1
_C61: Colombia_P_Argentina + Colombia_P_Serbia <= 1
_C62: Colombia_P_Argentina + Greece_P_Colombia <= 1
_C63: Colombia_P_Serbia + Guatemala_P_Colombia <= 1
_C64: Guatemala_P_Colombia + Serbia_P_Greece <= 1
_C65: Colombia_P_Argentina + Serbia_P_Greece <= 1</pre>
_C66: Colombia_P_Argentina + Colombia_P_Serbia <= 1
_C67: Colombia_P_Argentina + Greece_P_Colombia <= 1
_C68: Colombia_P_Serbia + Guatemala_P_Colombia <= 1
_C69: Guatemala_P_Colombia + Serbia_P_Greece <= 1
_C70: Greece_P_Colombia + Guatemala_P_Colombia <= 1</pre>
_C71: Colombia_P_Argentina + Serbia_P_Greece <= 1</pre>
_C72: Colombia_P_Argentina + Colombia_P_Serbia <= 1
_C73: Colombia_P_Argentina + Greece_P_Colombia <= 1</pre>
_C74: Colombia_P_Serbia + Guatemala_P_Colombia <= 1
_C75: Guatemala_P_Colombia + Serbia_P_Greece <= 1</pre>
_C76: Greece_P_Colombia + Guatemala_P_Colombia <= 1
_C77: Argentina_P_Guatemala + Colombia_P_Serbia <= 1</pre>
VARIABLES
0 <= Argentina P Guatemala <= 1 Integer
0 <= Colombia_P_Argentina <= 1 Integer</pre>
0 <= Colombia_P_Serbia <= 1 Integer</pre>
GINI 25.09 <= 1 Continuous
GINI 34.57 <= 1 Continuous
GINI_44.04 <= 1 Continuous
GINI_53.52 <= 1 Continuous</pre>
GINI_63.00 <= 1 Continuous</pre>
0 <= Greece_P_Colombia <= 1 Integer</pre>
Gross_Domestic_Product_1626.84 <= 1 Continuous</pre>
Gross Domestic Product 26.57 <= 1 Continuous
Gross_Domestic_Product_3227.12 <= 1 Continuous</pre>
Gross_Domestic_Product_4827.39 <= 1 Continuous</pre>
Gross Domestic Product 6427.67 <= 1 Continuous
```

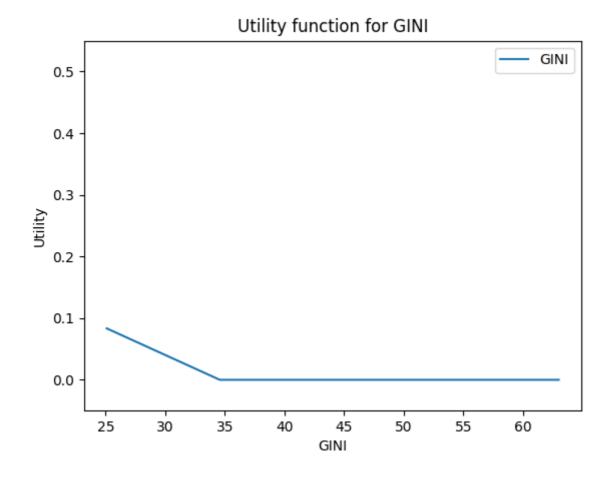
```
0 <= Guatemala_P_Colombia <= 1 Integer</pre>
Income_Tax_Rate_11.80 <= 1 Continuous</pre>
Income_Tax_Rate_21.10 <= 1 Continuous</pre>
Income_Tax_Rate_30.40 <= 1 Continuous</pre>
Income_Tax_Rate_39.70 <= 1 Continuous</pre>
Income_Tax_Rate_49.00 <= 1 Continuous</pre>
Inflation_0.02 <= 1 Continuous</pre>
Inflation_0.83 <= 1 Continuous</pre>
Inflation_1.64 <= 1 Continuous</pre>
Inflation_2.46 <= 1 Continuous</pre>
Inflation_3.27 <= 1 Continuous</pre>
0 <= Serbia_P_Greece <= 1 Integer</pre>
Total_Reserves_112092471695.58 <= 1 Continuous</pre>
Total_Reserves_223206647797.05 <= 1 Continuous
Total_Reserves_334320823898.53 <= 1 Continuous</pre>
Total_Reserves_445435000000.00 <= 1 Continuous
Total_Reserves_978295594.10 <= 1 Continuous
Unemployment Rate 0.04 <= 1 Continuous
Unemployment_Rate_0.32 <= 1 Continuous</pre>
Unemployment_Rate_0.61 <= 1 Continuous</pre>
Unemployment_Rate_0.89 <= 1 Continuous</pre>
Unemployment_Rate_1.18 <= 1 Continuous</pre>
```

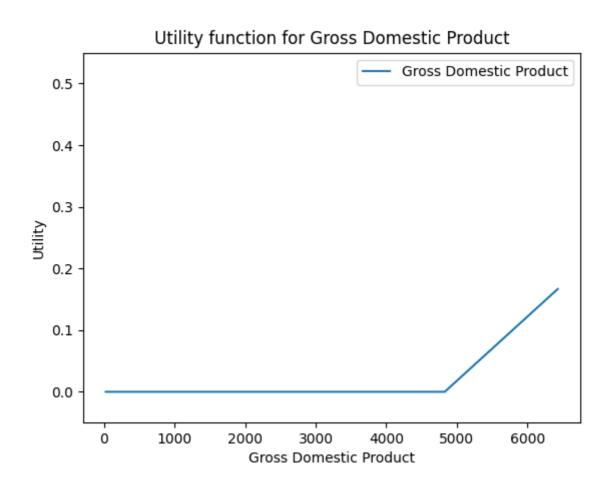
objective value:

solution found

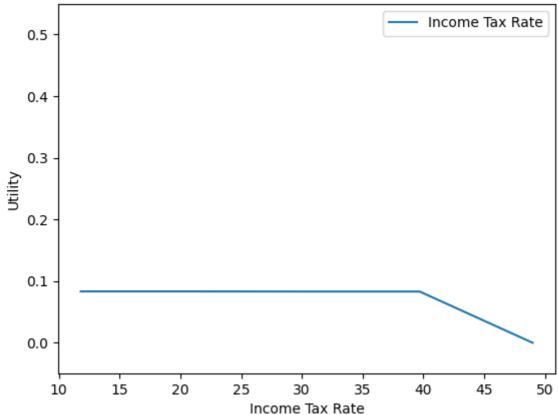
Objective value: 2.0

Plots:

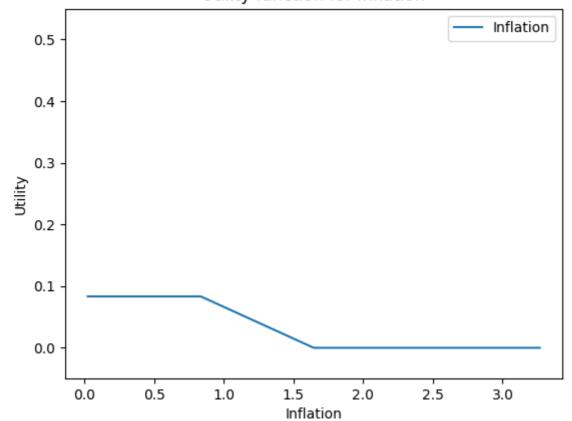




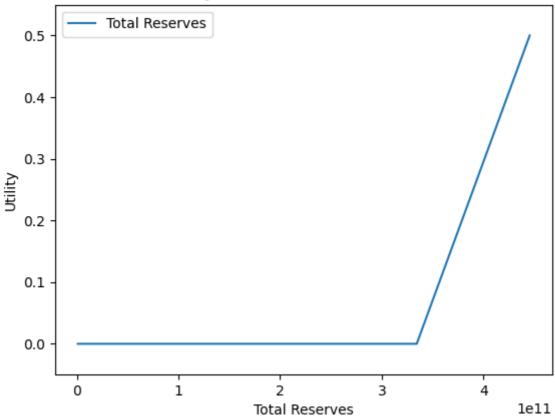




Utility function for Inflation



Utility function for Total Reserves



Utility function for Unemployment Rate

