

ORIGIN := 1

$x_1 :=$	(0.0386)	(0.4060)	(61.555)
	0.0544	0.4390	64.676
	0.0667	0.4530	66.110
	0.1027	0.4698	67.822
	0.1856	0.4768	68.539
	0.2050	0.4779	68.664
	0.2273	0.4794	68.759
	0.2524	0.4811	68.831
	0.2770	0.4826	68.878
	0.3008	0.4839	68.912
	0.3449	0.4848	68.943
	0.4065	0.4849	68.948
	0.4163	0.4848	68.967
	0.5004	0.4821	68.960
	0.5008	0.4821	68.969
	0.5987	0.4795	68.962
	0.6043	0.4795	68.960
	0.6517	0.4796	68.948
	0.7008	0.4800	68.927
	0.7256	0.4810	68.902
	0.7516	0.4824	68.850
	0.7757	0.4840	68.748
	0.7986	0.4859	68.616
	0.8259	0.4890	68.353
	0.8489	0.4931	67.935
	0.8711	0.4992	67.284
	0.8968	0.5112	66.016
	0.9224	0.5336	63.747
	0.9472	0.5764	59.703
	(0.9757)	(0.6925)	(50.569)

i := 1 .. 30

$P_1 := 35.464$

$P_2 := 37.313$

$$\gamma_{1_i} := \frac{y_{1_i} \cdot P_i}{x_{1_i} \cdot P_1}$$

$$\gamma_{2_i} := \frac{(1 - y_{1_i}) \cdot P_i}{(1 - x_{1_i}) \cdot P_2}$$

$$\gamma_1 =$$

	1
1	18.256
2	14.717
3	12.661
4	8.748
5	4.965
6	4.514
7	4.089
8	3.699
9	3.384
10	3.126
11	2.733
12	2.319
13	2.265
14	1.873
15	1.872
16	1.557
17	1.543
18	1.431
19	1.331
20	1.288
21	1.246
22	1.21
23	1.177
24	1.141
25	1.113
26	1.087
27	1.061
28	1.04
29	1.024
30	1.012

$$\gamma_2 =$$

	1
1	1.019
2	1.028
3	1.038
4	1.074
5	1.18
6	1.209
7	1.242
8	1.28
9	1.321
10	1.363
11	1.453
12	1.604
13	1.631
14	1.916
15	1.918
16	2.397
17	2.431
18	2.761
19	3.21
20	3.493
21	3.845
22	4.239
23	4.694
24	5.377
25	6.108
26	7.006
27	8.38
28	10.268
29	12.837
30	17.15

Part (b)

$$\Lambda_{12} = \frac{1}{31.149} \cdot \exp\left(1 - \frac{1}{21.977} \cdot \exp(1 - \Lambda_{12})\right) \text{ solve } \rightarrow 0.077831579922750094356$$

$$\Lambda_{12} := 0.078$$

$$\Lambda_{21} := 1 - \ln(\Lambda_{12} \cdot 31.149) = 0.112$$

$$x_{2_i} := 1 - x_{1_i}$$

$$\gamma_{1_i} := \exp \left[- \left[\ln(x_{1_i} + \Lambda_{12} \cdot x_{2_i}) + x_{2_i} \cdot \left(\frac{\Lambda_{21}}{x_{2_i} + \Lambda_{21} \cdot x_{1_i}} - \frac{\Lambda_{12}}{x_{1_i} + \Lambda_{12} \cdot x_{2_i}} \right) \right] \right]$$

$$\gamma_{2_i} := \exp \left[- \left[\ln(x_{2_i} + \Lambda_{21} \cdot x_{1_i}) + x_{1_i} \cdot \left(\frac{\Lambda_{12}}{x_{1_i} + \Lambda_{12} \cdot x_{2_i}} - \frac{\Lambda_{21}}{x_{2_i} + \Lambda_{21} \cdot x_{1_i}} \right) \right] \right]$$

$$y_{1_i} := \frac{P_1 \cdot x_{1_i} \cdot \gamma_{1_i}}{P_i}$$

	1
1	0.3388
2	0.3702
3	0.3867
4	0.4174
5	0.4459
6	0.4485
7	0.451
8	0.4532
9	0.4549
10	0.4563
11	0.4585
12	0.4608
13	0.461
14	0.4636
15	0.4636
16	0.4665
17	0.4667
18	0.4684
19	0.4705
20	0.4718
21	0.4735
22	0.4757

$y_1 =$

	1
1	15.235
2	12.41
3	10.807
4	7.773
5	4.643
6	4.236
7	3.847
8	3.485
9	3.19
10	2.948
11	2.584
12	2.204
13	2.154
14	1.802
15	1.8
16	...

$\gamma_1 =$

23	0.4781
24	0.4821
25	0.4873
26	0.4945
27	0.5075
28	0.5302
29	0.5723
30	0.6871