

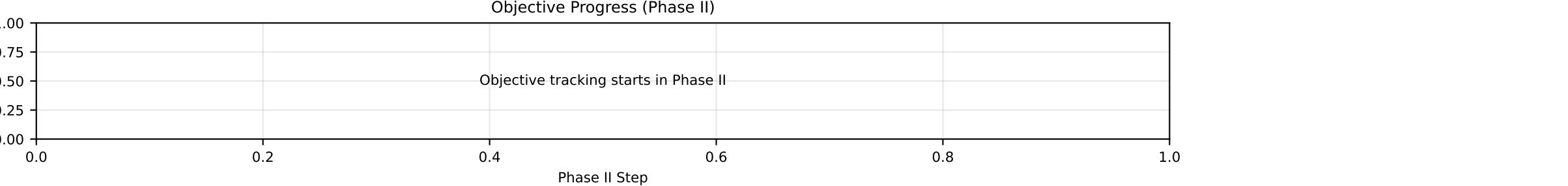
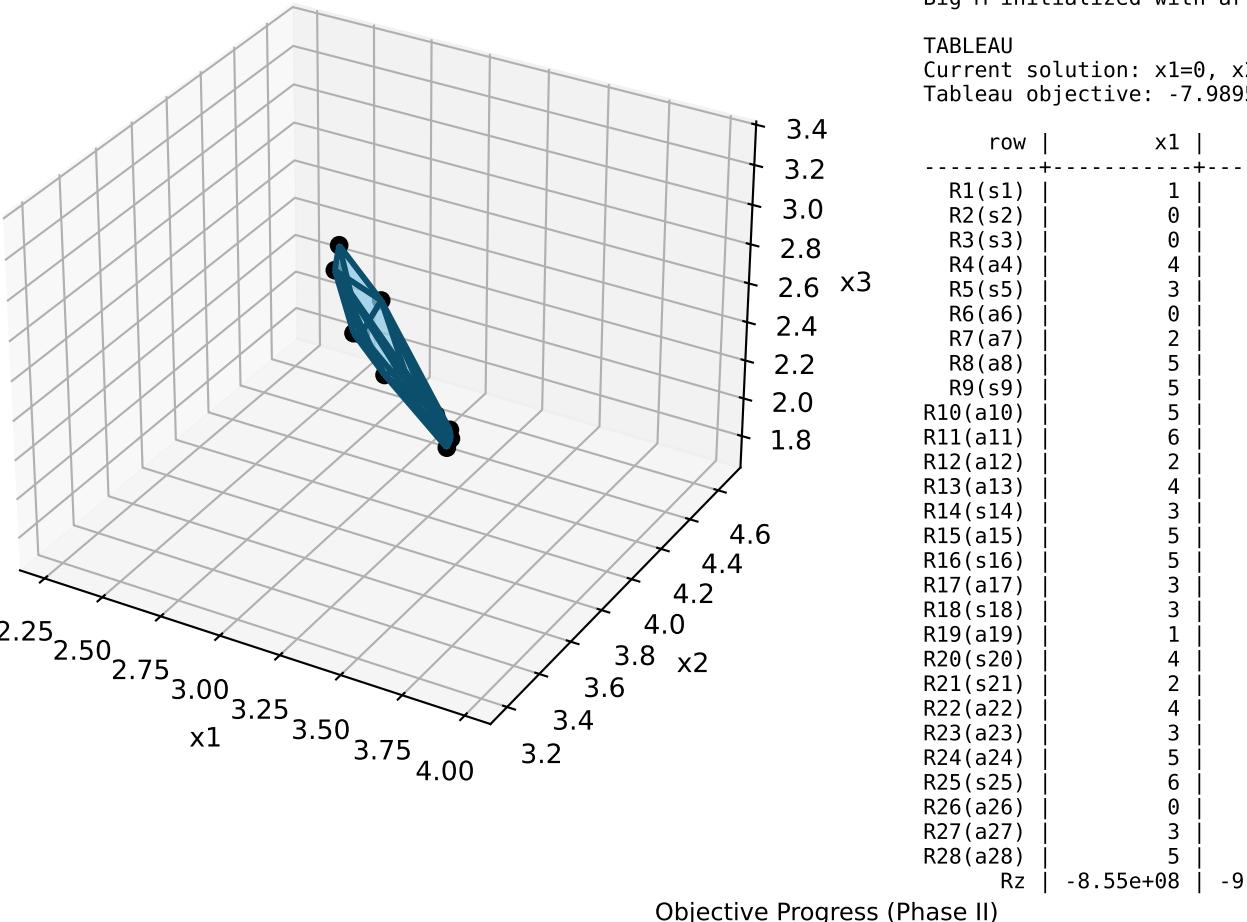
## **base Simplex Report**

asible polytope + extreme points + simplex path State 1/31

*tificial penalty M=1.5e+07.*

2-0      x 3-0

$\angle \equiv 0$ ,  $\chi_3 \equiv 0$



## **Phase Simplex Report**

feasible polytope + extreme points + simplex path State 2/3

-M step 1 | ENTER: x2 | LEAVE: s14

Rule: DANTZIG

rate: DANTZIG  
§14 leaves

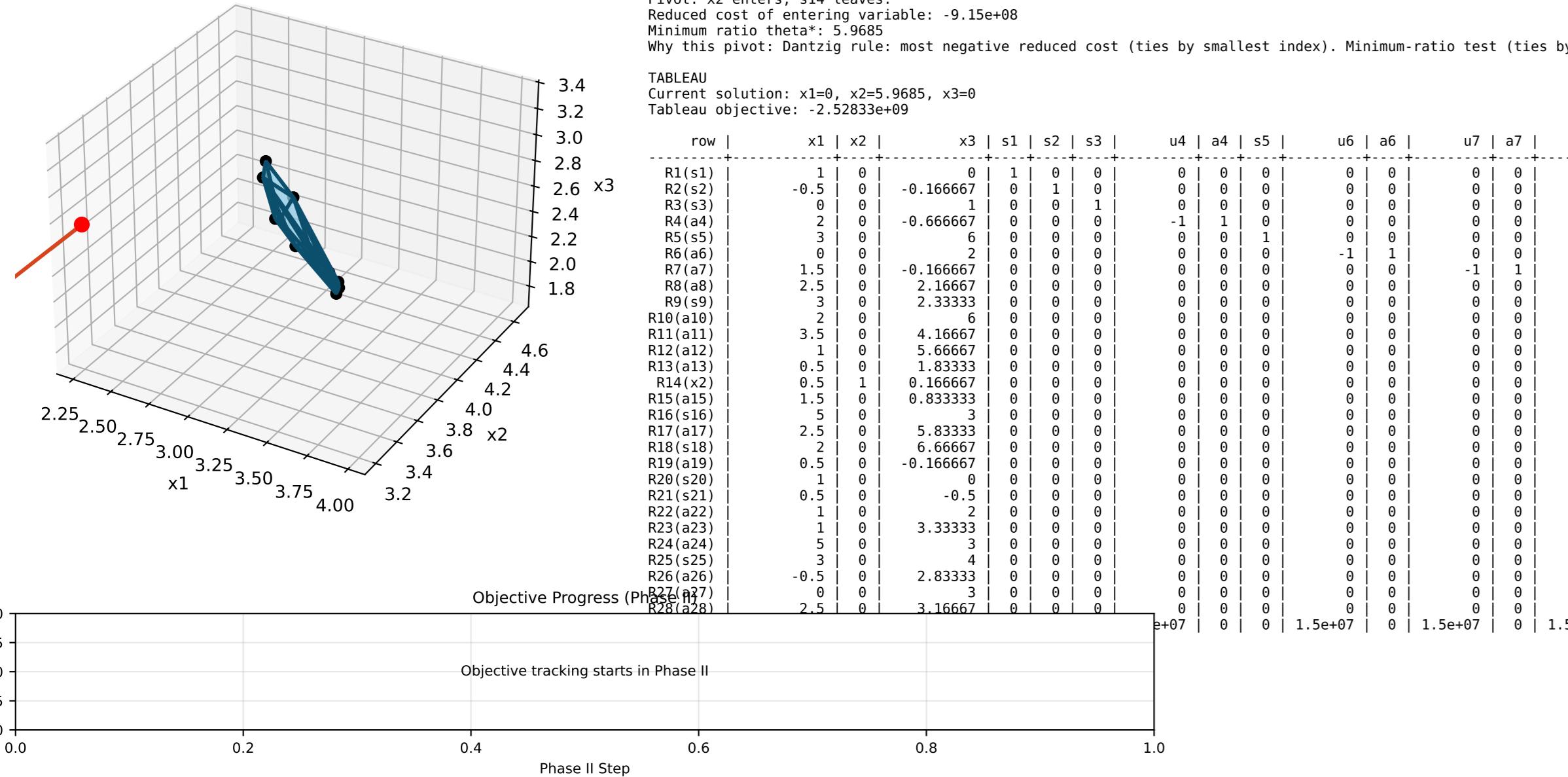
entering variable: 0.15e+08

beta\*: E\_068E

Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

$x_1=0 \quad x_2=5.9685 \quad x_3=0$

a: -3.52833e+09



# Two-Phase Simplex Report

Feasible polytope + extreme points + simplex path

State 3/31 | BIG-M step 2 | ENTER: x3 | LEAVE: a26

## COMMENTS

Teaching Mode | Rule: DANTZIG

Pivot: x3 enters, a26 leaves.

Reduced cost of entering variable: -6.725e+08

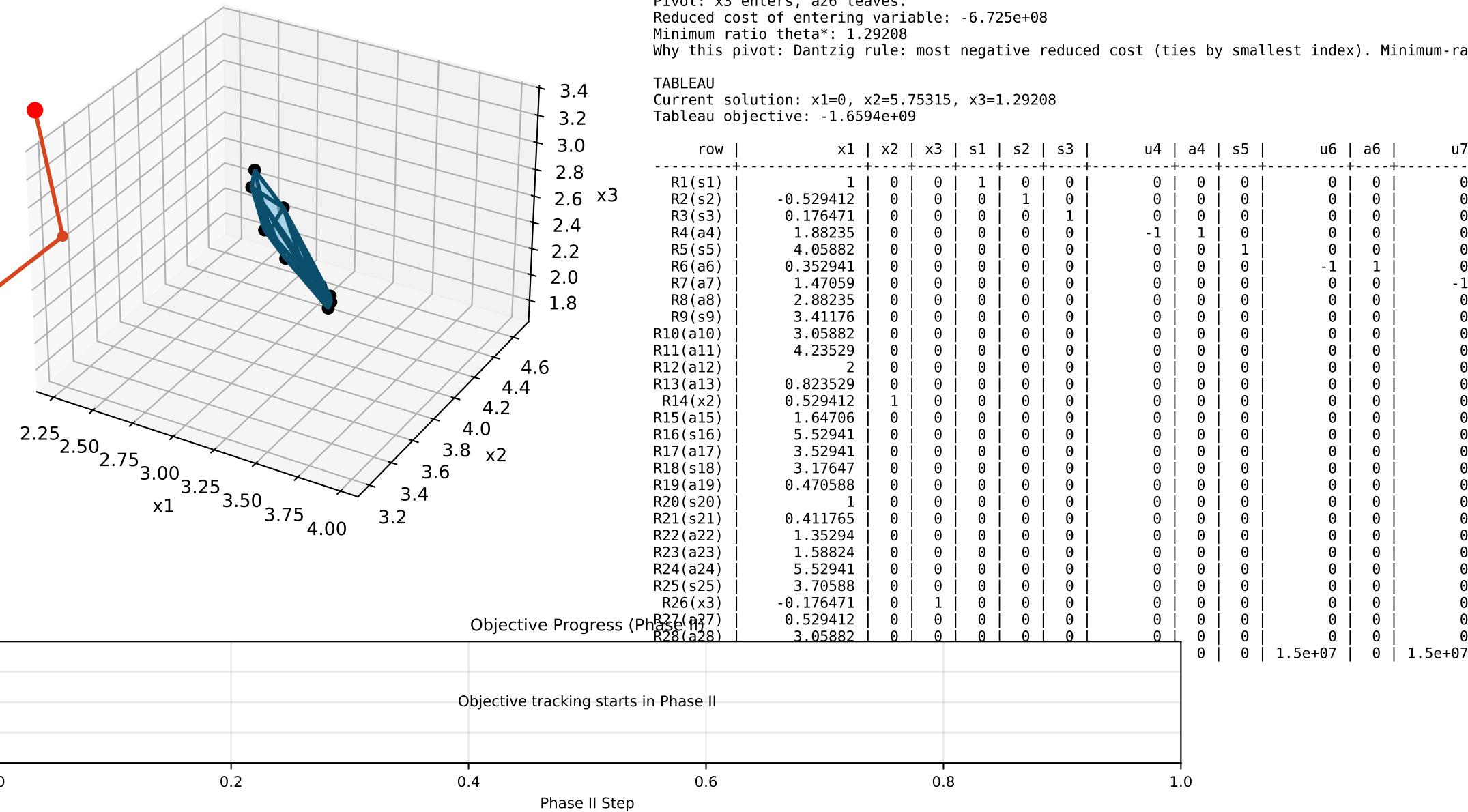
Minimum ratio theta\*: 1.29208

Why this pivot: Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

## TABLEAU

Current solution:  $x_1=0$ ,  $x_2=5.75315$ ,  $x_3=1.29208$

Tableau objective: -1.6594e+09



row	x1	x2	x3	s1	s2	s3	u4	a4	s5	u6	a6	u7	a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	u21	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio
R1(s1)	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	inf										
R2(s2)	-0.529412	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.24685	inf										
R3(s3)	0.176471	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.7079	12										
R4(a4)	1.88235	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.36797	inf										
R5(s5)	4.05882	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.5602	4.21878										
R6(a6)	0.352941	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.29208	1.92175										
R7(a7)	1.47059	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.01716	inf										
R8(a8)	2.88235	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.06791	5.47726										
R9(s9)	3.41176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.4309	6.61959										
R10(a10)	3.05882	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.3813	3.35562										
R11(a11)	4.23529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.1398	4.92562										
R12(a12)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.73524	2.83359										
R13(a13)	0.823529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.87532	2.86043										
R14(x2)	0.529412	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.75315	35.811										
R15(a15)	1.64706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.7017	5.73411										
R16(s16)	5.52941	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22.3695	8.74858										
R17(a17)	3.52941	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.6853	3.4667										
R18(s18)	3.17647	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.934	3.83218										
R19(a19)	0.470588	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.14918	inf										
R20(s20)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.77906	inf										
R21(s21)	0.411765	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.20046	inf										
R22(a22)	1.35294	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.30495	3.44455										
R23(a23)	1.58824	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.31986	2.88803										
R24(a24)	5.52941	0	0	0	0																																												

## **Phase Simplex Report**

feasible polytope + extreme points + simplex path State 4/3

Step 3 | ENTER: x1 | LEAVE: a7

e: DANTZIG

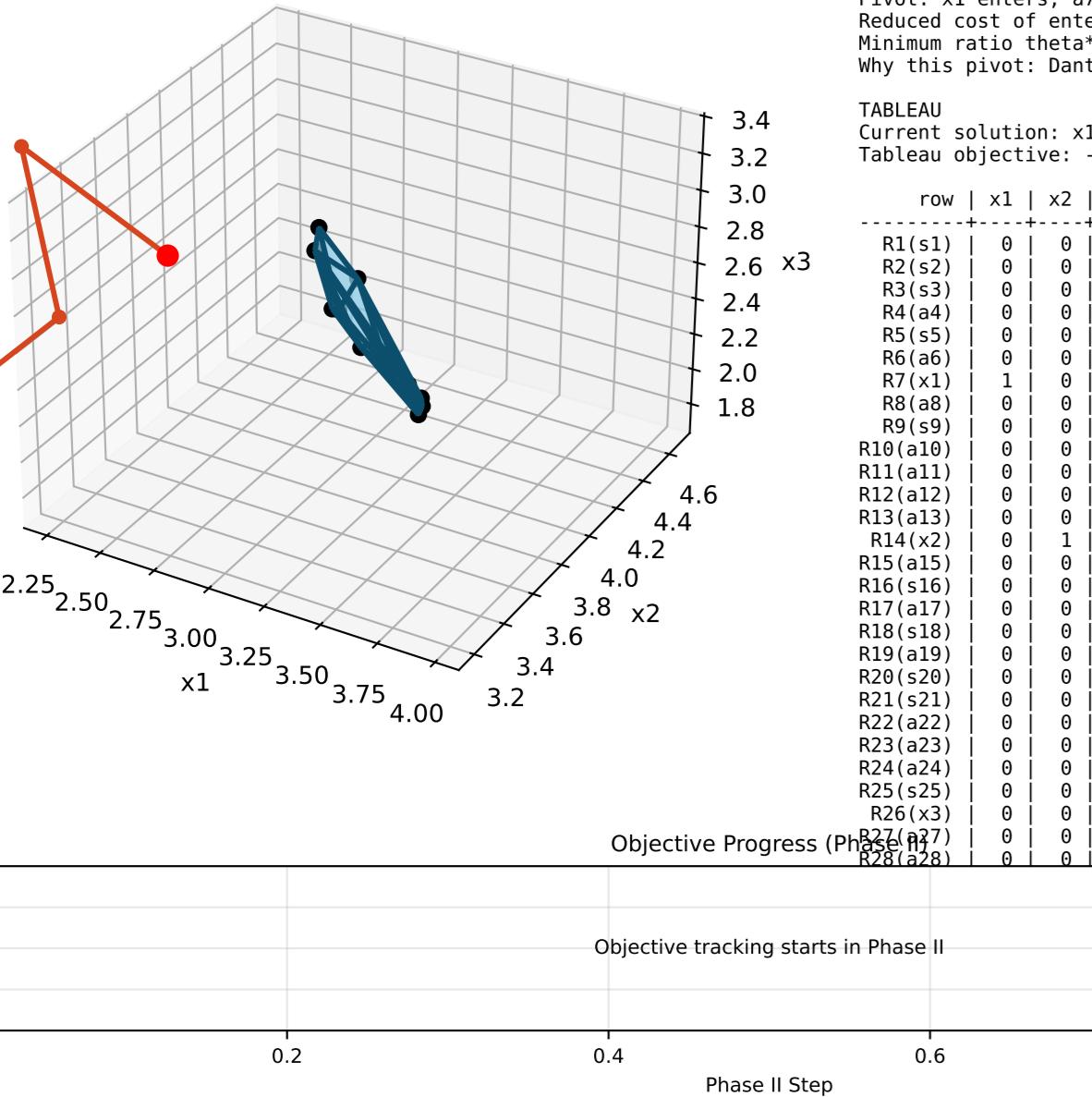
' leaves.

leaves:  
target variable: -5.16176e+08

\*: 1.37167

Max rule: most negative reduced cost (ties)

largest ratio. Most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).



$x_1=1.37167$ ,  $x_2=5.02697$ ,  $x_3=1.53413$   
 $9.51383 \times 10^8$

x3	s1	s2	s3	u4	a4	s5	u6	a6	u7	a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	s21	u22	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio
0	1	0	0	0	0	0	0	0	0.68	-0.68	0	0	0	0	0	0	0	0	0	0	0.12	0	0	0	0	0	0	0	0	0	0.04	-0.04	0	0	0	0	10.6283	12									
0	0	1	0	0	0	0	0	0	-0.36	0.36	0	0	0	0	0	0	0	0	0	0	-0.24	0	0	0	0	0	0	0	0	-0.08	0.08	0	0	0	0	6.97303	inf										
0	0	0	1	0	0	0	0	0	0.12	-0.12	0	0	0	0	0	0	0	0	0	0	0.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.4659	60.6782										
0	0	0	0	0	-1	1	0	0	1.28	-1.28	0	0	0	0	0	0	0	0	0	0	-0.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.78602	2.32049										
0	0	0	0	0	0	0	1	0	0	2.76	-2.76	0	0	0	0	0	0	0	0	0	0.84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.9929	4.32643										
0	0	0	0	0	0	0	0	-1	1	0.24	-0.24	0	0	0	0	0	0	0	0	0	0.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.775222	3.56813										
0	0	0	0	0	0	0	0	0	-0.68	0.68	0	0	0	0	0	0	0	0	0	-0.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.37167	1.37167											
0	0	0	0	0	0	0	0	0	1.96	-1.96	-1	1	0	0	0	0	0	0	0	-0.36	0	0	0	0	0	0	0	0	0	0.88	-0.88	0	0	0	0	5.11428	3.14601										
0	0	0	0	0	0	0	0	0	0	2.32	-2.32	0	0	1	0	0	0	0	0	-0.12	0	0	0	0	0	0	0	0	0	0.96	-0.96	0	0	0	0	7.75106	3.64353										
0	0	0	0	0	0	0	0	0	2.08	-2.08	0	0	0	-1	1	0	0	0	0	-0.28	0	0	0	0	0	0	0	0	0	2.24	-2.24	0	0	0	0	8.18559	4.04772										
0	0	0	0	0	0	0	0	0	2.88	-2.88	0	0	0	0	-1	1	0	0	0	-0.08	0	0	0	0	0	0	0	0	0	1.64	-1.64	0	0	0	0	9.33037	3.57467										
0	0	0	0	0	0	0	0	0	1.36	-1.36	0	0	0	0	0	0	-1	1	0	-0.24	0	0	0	0	0	0	0	0	0	2.08	-2.08	0	0	0	0	5.99191	4.36762										
0	0	0	0	0	0	0	0	0	0.56	-0.56	0	0	0	0	0	0	0	0	-1	1	-0.96	0	0	0	0	0	0	0	0	0	0.68	-0.68	0	0	0	0	1.74572	3.49146									
0	0	0	0	0	0	0	0	0	0.36	-0.36	0	0	0	0	0	0	0	0	0	0.24	0	0	0	0	0	0	0	0	0	0.08	-0.08	0	0	0	0	5.02697	10.8671										
0	0	0	0	0	0	0	0	0	1.12	-1.12	0	0	0	0	0	0	0	0	0	-0.92	-1	1	0	0	0	0	0	0	0	0.36	-0.36	0	0	0	0	1.44248	2.24746										
0	0	0	0	0	0	0	0	0	3.76	-3.76	0	0	0	0	0	0	0	0	0	0.84	0	0	1	0	0	0	0	0	0	1.28	-1.28	0	0	0	0	14.785	4.04555										
0	0	0	0	0	0	0	0	0	2.4	-2.4	0	0	0	0	0	0	0	0	0	0.6	0	0	0	-1	1	0	0	0	0	0	0	2.2	-2.2	0	0	0	0	7.84414	3.59417								
0	0	0	0	0	0	0	0	0	2.16	-2.16	0	0	0	0	0	0	0	0	0	0.44	0	0	0	0	0	0	0	0	0	2.48	-2.48	0	0	0	0	12.5769	5.33107										
0	0	0	0	0	0	0	0	0	0.32	-0.32	0	0	0	0	0	0	0	0	0	-0.12	0	0	0	0	0	0	0	0	0	-0.04	0.04	0	0	0	0	0.503686	2.44242										
0	0	0	0	0	0	0	0	0	0.68	-0.68	0	0	0	0	0	0	0	0	0	-0.88	0	0	0	0	0	0	0	0	0	0.04	-0.04	0	0	0	0	4.40739	5.77906										
0	0	0	0	0	0	0	0	0	0.28	-0.28	0	0	0	0	0	0	0	0	0	-0.48	0	0	0	0	0	0	0	0	0	-0.16	0.16	0	0	0	0	2.63566	7.77255										
0	0	0	0	0	0	0	0	0	0.92	-0.92	0	0	0	0	0	0	0	0	0	-0.72	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	2.44917	3.18192										
0	0	0	0	0	0	0	0	0	1.08	-1.08	0	0	0	0	0	0	0	0	0	-0.28	0	0	0	0	0	0	0	0	0	1.24	-1.24	0	0	0	0	3.14133	3.34954										
0	0	0	0	0	0	0	0	0	3.76	-3.76	0	0	0	0	0	0	0	0	0	0.84	0	0	0	-1	1	0	0	0	0	0	0	1.28	-1.28	0	0	0	0	9.11113	3.01942								
0	0	0	0	0	0	0	0	0	2.52	-2.52	0	0	0	0	0	0	0	0	0	-0.32	0	0	0	0	0	0	0	0	0	1.56	-1.56	0	0	0	0	12.2444	4.67571										
1	0	0	0	0	0	0	0	0	-0.12	0.12	0	0	0	0	0	0	0	0	0	-0.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.53413	inf										
0	0	0	0	0	0	0	0	0	0.36	-0.36	0	0	0	0	0	0	0	0	0	-0.76	0	0	0	0	0	0	0	0	0	1.08	-1.08	-1	1	0	0	0.587577	2.48153										
0	0	0	0	0	0	0	0	0	2.08	-2.08	0	0	0	0	0	0	0	0	0	-0.28	0	0	0	0	0	0	0	0	0	1.24	-1.24	0	0	0	0	5.41692	3.14258										
0	0	0	0	0	0	0	0	0	1.5e+07	-3.36e+08	3.51e+08	1.5e+07	0	1.5e+07	0	1.5e+07	0	1.5e+07	0	5.1e+07	1.5e+07	0	1.5e+07	0	1.5e+07	0	1.5e+07	0	-2.43e+08	2.58e+08	1.5e+07	0	1.5e+07	0	-9.51383e+08	1.54258											



## **Case Simplex Report**

feasible polytope + extreme points + simplex path State 6/31

**COMMENTS**  
Teaching Mode | Rule: DANTZIG  
Pivot: u15 enters, a4 leaves.  
Reduced cost of entering variable: -2.85e+08  
Minimum ratio theta\*: 0.120281  
Why this pivot: Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by sm

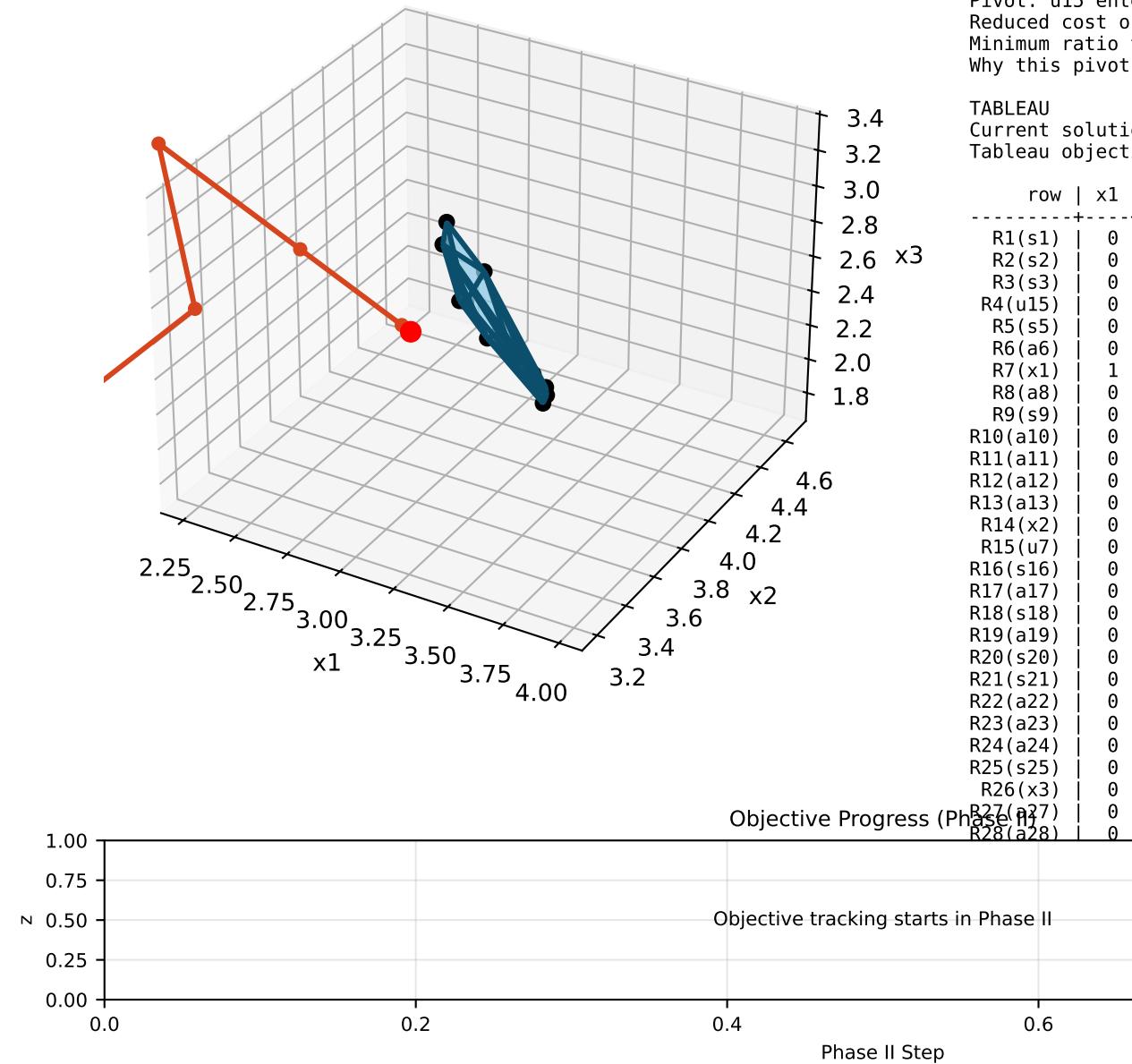


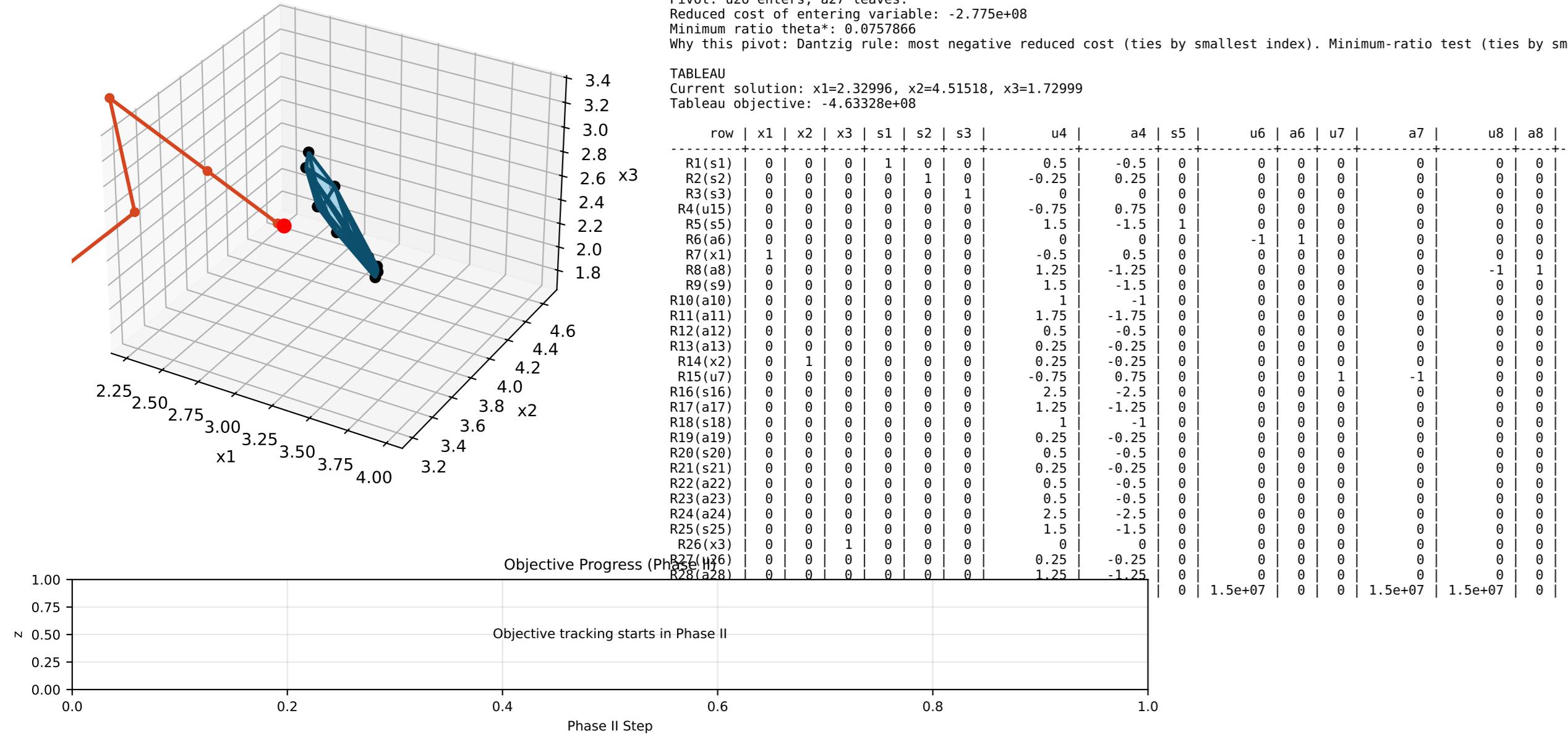
TABLEAU  
Current solution:  $x_1=2.32049$ ,  $x_2=4.52466$ ,  $x_3=1.70157$   
Tableau objective:  $-4.84358e+08$

## **base Simplex Report**

asible polytope + extreme points + simplex path State 7/31

step 6 | ENTER: u26 | LEAVE: a27

```
le: DANTZIG
a27 leaves.
tering variable: -2.775e+08
a*: 0.0757866
ntzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).
```



s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	s21	u22	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio		
0	0	0	0	0	0	0	0	0	0.4444444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1111111	-0.1111111	0	0	9.67004	77.4361				
0	0	0	0	0	0	0	0	0	-0.4444444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1111111	0.1111111	0	0	7.48482	inf				
0	0	0	0	0	0	0	0	0	0.3333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3333333	-0.3333333	0	0	10.27	27.4625				
0	0	0	0	0	0	0	0	0	0.2222222	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.4444444	0.4444444	0	0	0.158174	inf				
0	0	0	0	0	0	0	0	0	3.333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.666667	-0.666667	0	0	7.94282	3.10162				
0	0	0	0	0	0	0	0	0	0.666667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.666667	-0.666667	0	0	0.383504	0.587126				
0	0	0	0	0	0	0	0	0	-0.4444444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1111111	0.1111111	0	0	2.32996	inf				
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2.29419	2.11506		
1	0	0	0	0	0	0	0	0	1.444444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.41917	3.61113		
0	-1	1	0	0	0	0	0	0	1.88889	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.09385	2.11332		
0	0	-1	1	0	0	0	0	0	2.111111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.16026	2.65592		
0	0	0	-1	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.92375	1.81968	
0	0	0	0	-1	1	0	0	-1	-0.333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.907495	1.28578	
0	0	0	0	0	0	0	0	0	0.4444444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.51518	36.1973	
0	0	0	0	0	0	0	0	0	-0.4444444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4048	inf	
0	0	0	0	0	0	0	0	0	3.222222	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.40597	5.45063	
0	0	0	0	0	0	0	0	0	2.88889	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.3059	1.79815	
0	0	0	0	0	0	0	0	0	2.777778	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.35463	3.47747	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0571818	inf
0	0	0	0	0	0	0	0	0	-0.5555556	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.4491	27.6686	
0	0	0	0	0	0	0	0	0	-0.4444444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.25444	inf	
0	0	0	0	0	0	0	0	0	0.1111111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.09916	1.33197	
0	0	0	0	0	0	0	0	0	0.888889	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.53018	1.18864
0	0	0	0	0	0	0	0	0	3.222222	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.73209	2.20841
0	0	0	0	0	0	0	0	0	1.666667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.58606	4.65502
0	0	0	0	0	0	0	0	0	-0.3333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.72999	inf
0	0	0	0	0	0	0	0	0	-0.5555556	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0757866	0.0757866
0	0	0	0	0	0	0	0	0	1.333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.40097	1.67643

## **Phase Simplex Report**

feasible polytope + extreme points + simplex path State 8/31

M step 7 | ENTER: s14 | LEAVE: a6

ule: DANTZIG

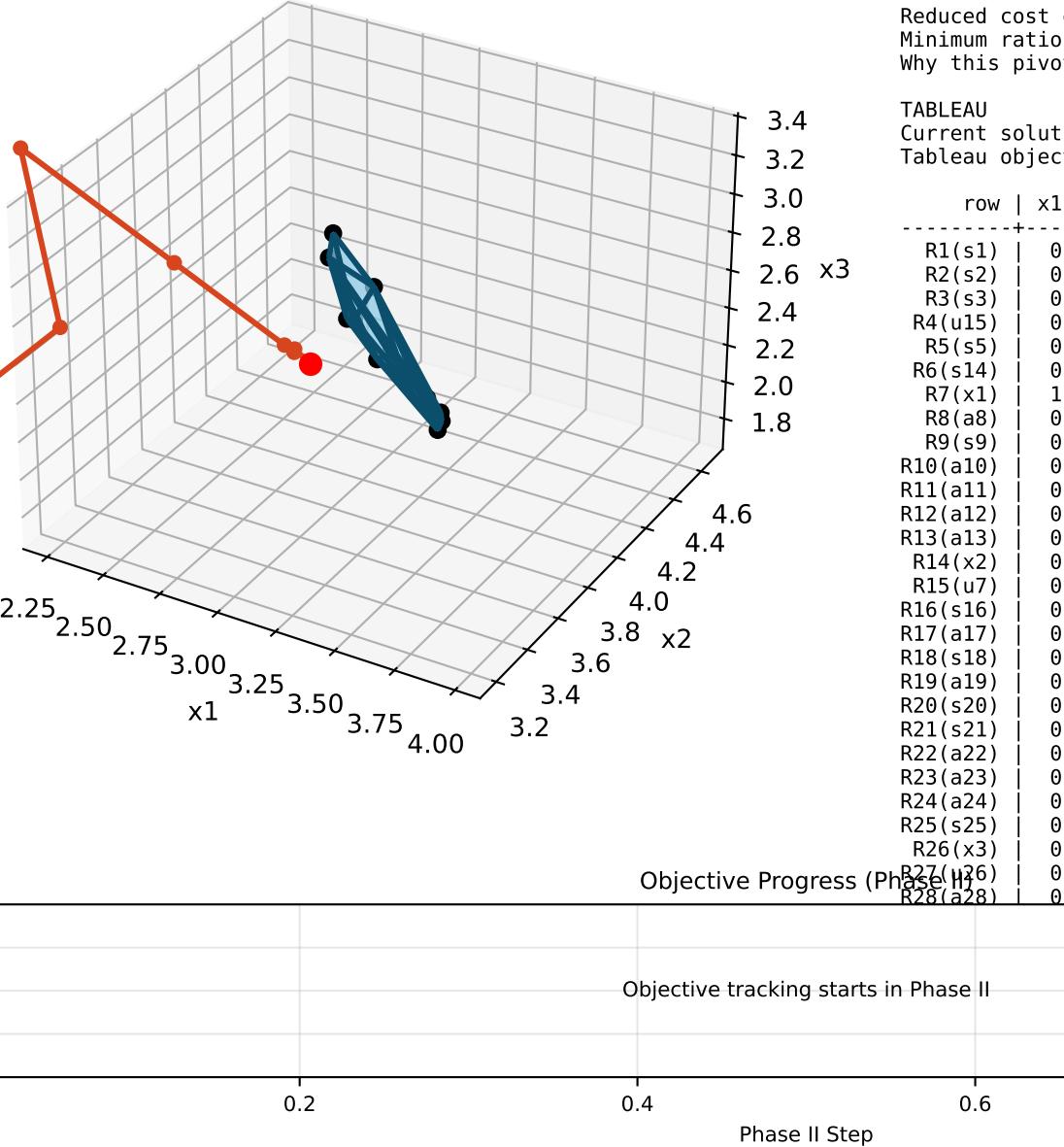
26 leaves

entering variable: 3.36667e+08

Intercept Variable: -2.3666e+08  
t=8.053523

ta\*: 0.5/525/

Kantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).



$x_1=2.58563$ ,  $x_2=4.25952$ ,  $x_3=1.92175$   
: -3.27184e+08

2	x3	s1	s2	s3	u4	a4	s5	u6	a6	u7	a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	s21	u22	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio
0	0	1	0	0	0.5	-0.5	0	0.666667	-0.666667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.41437	21.7576					
0	0	0	1	0	-0.25	0.25	0	-0.666667	0.666667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.74048	inf							
0	0	0	0	1	0	0	0	0.5	-0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.0783	30.81					
0	0	0	0	0	-0.75	0.75	0	0.333333	-0.333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0303394	0.711784							
0	0	0	0	0	1.5	-1.5	1	5	-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.02529	2.38284					
0	0	0	0	0	0	0	0	-1.5	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.575257	0.575257					
0	0	0	0	0	-0.5	0.5	0	-0.666667	0.666667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.58563	inf					
0	0	0	0	0	1.25	-1.25	0	1.5	-1.5	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.71893	2.29419					
0	0	0	0	0	1.5	-1.5	0	2.16667	-2.16667	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.58825	3.05943						
0	0	0	0	0	1	-1	0	2.83333	-2.83333	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.00725	2.69674						
0	0	0	0	0	1.75	-1.75	0	3.16667	-3.16667	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.94583	2.44433							
0	0	0	0	0	0.5	-0.5	0	3	-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.77324	1.96187				
0	0	0	0	0	0.25	-0.25	0	-0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.09925	inf					
1	0	0	0	0	0.25	-0.25	0	0.666667	-0.666667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.25952	10.1592						
0	0	0	0	0	-0.75	0.75	0	-0.666667	0.666667	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.66047	inf						
0	0	0	0	0	2.5	-2.5	0	4.83333	-4.83333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.55237	2.9191						
0	0	0	0	0	1.25	-1.25	0	4.33333	-4.33333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.64405	1.4905						
0	0	0	0	0	1	-1	0	4.16667	-4.16667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.7567	3.36767					
0	0	0	0	0	0.25	-0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0571818	inf				
0	0	0	0	0	0.5	-0.5	0	-0.833333	0.833333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.76869	inf				
0	0	0	0	0	0.25	-0.25	0	-0.666667	0.666667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.51011	inf				
0	0	0	0	0	0.5	-0.5	0	0.166667	-0.166667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.03524	9.89243					
0	0	0	0	0	0.5	-0.5	0	1.33333	-1.33333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.01884	1.72145					
0	0	0	0	0	2.5	-2.5	0	4.83333	-4.83333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.87848	1.15823					
0	0	0	0	0	1.5	-1.5	0	2.5	-2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.15164	inf		
0	0	0	0	0	0	0	0	-0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.92175	inf			
0	0	0	0	0	0.25	-0.25	0	-0.833333	0.833333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.395374	inf				

Phase Simplex Report

asible polytope + extreme points + simplex path State 9/31

M step 8 | ENTER: u6 | LEAVE: u15

Rule: DANTZIG

115 leaves

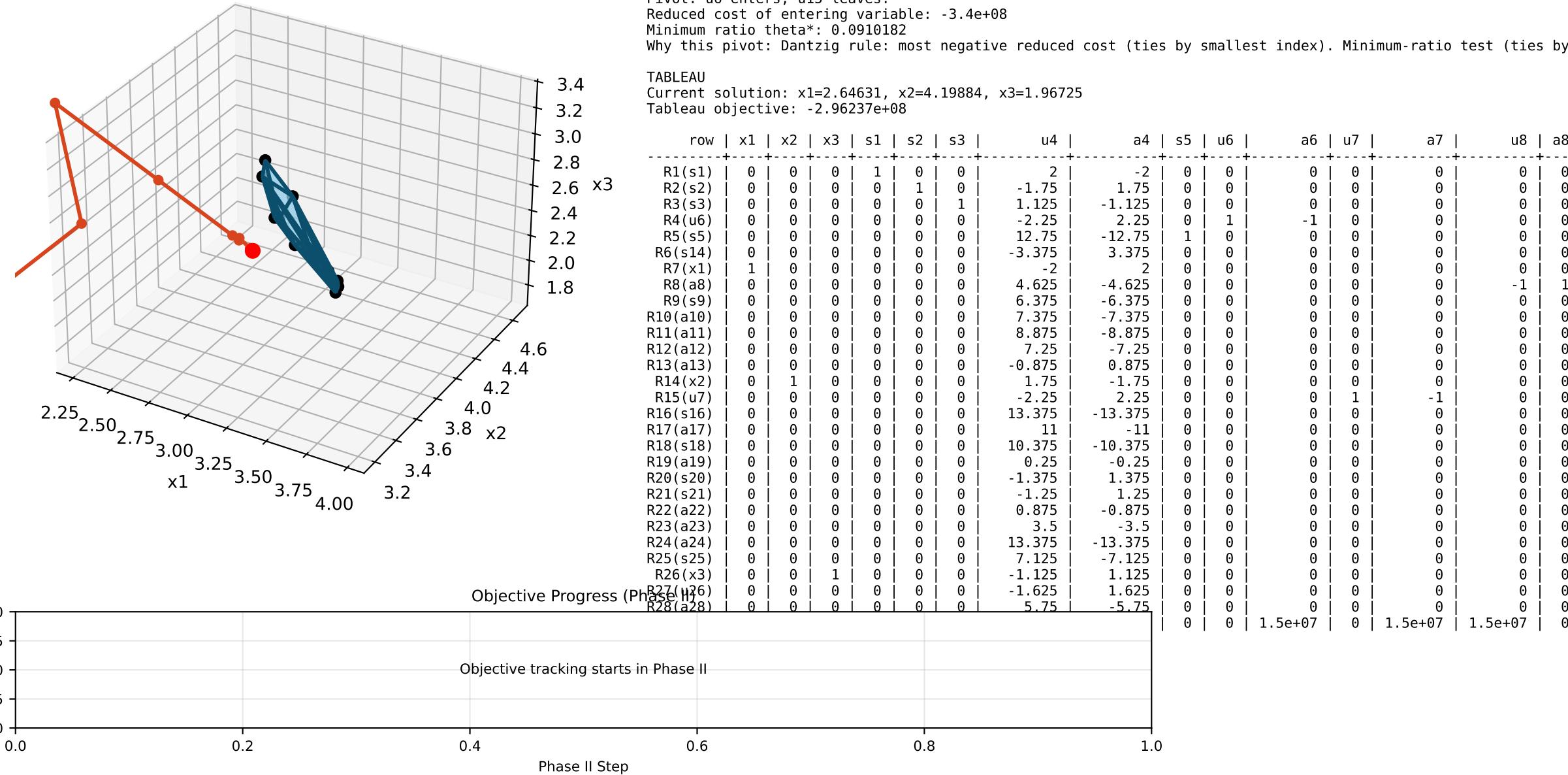
entering variable: -3.4e+08

data\*: 0

Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

$x_1=3.64631$ ,  $x_2=4.19884$ ,  $x_3=1.06725$

$x_1=2.64631$ ,  $x_2=4.19884$ ,  $x_3=1.96725$

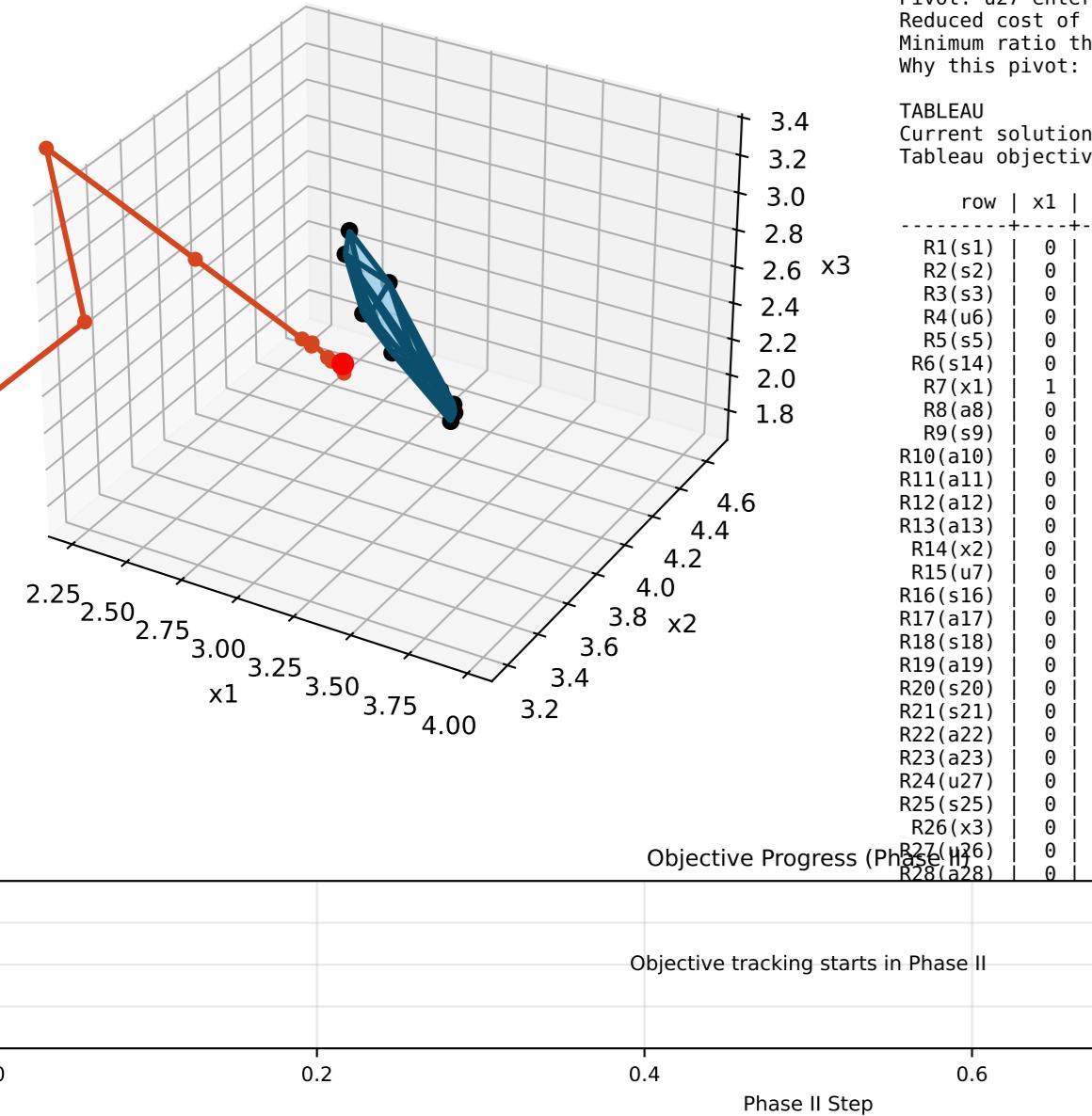


s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	s21	u22	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio		
0	0	0	0	0	0	0	0	0	0	-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	0	0	9.35369	14.1216			
0	0	0	0	0	0	0	0	0	0	2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	7.80116	inf			
0	0	0	0	0	0	0	0	0	0	-1.5	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	0	0	10.0327	20.1565			
0	0	0	0	0	0	0	0	0	0	3	-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	2	0	0	0.0910182	0.0910182			
0	0	0	0	0	0	0	0	0	0	-15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	-9	0	0	5.5702	1.20506			
0	0	0	0	0	0	0	0	0	1	4.5	-4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	2	0	0	0.711784	inf			
0	0	0	0	0	0	0	0	0	0	2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0.711784	inf			
0	0	0	0	0	0	0	0	0	0	-4.5	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	-3	0	0	1.5824	1.14595			
1	0	0	0	0	0	0	0	0	0	-6.5	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	-4	0	0	3.39104	1.65611			
0	-1	1	0	0	0	0	0	0	0	-8.5	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	-6	0	0	3.74937	1.41432				
0	0	0	-1	1	0	0	0	0	0	-9.5	9.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	-6	0	0	3.65761	1.24605			
0	0	0	0	0	-1	1	0	0	0	-9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.924412	inf			
0	0	0	0	0	0	0	0	0	0	1.5	-1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.14476	inf			
0	0	0	0	0	0	0	0	0	0	-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.19884	6.38927		
0	0	0	0	0	0	0	0	0	0	-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.72115	inf		
0	0	0	0	0	0	0	0	0	0	-14.5	14.5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.11245	1.56256			
0	0	0	0	0	0	0	0	0	0	-13	13	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.610164	0.610164		
0	0	0	0	0	0	0	0	0	0	-12.5	12.5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.37745	1.86161			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0571818	inf		
0	0	0	0	0	0	0	0	0	0	2.5	-2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.84453	inf			
0	0	0	0	0	0	0	0	0	0	2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.57079	inf		
0	0	0	0	0	0	0	0	0	0	-0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.02007	6.21145			
0	0	0	0	0	0	0	0	0	0	-4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.897479	0.764127		
0	0	0	0	0	0	0	0	0	0	-14.5	14.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.388652	0.43856		
0	0	0	0	0	0	0	0	0	0	-7.5	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.39976	3.05092		
0	0	0	0	0	0	0	0	0	0	1.5	-1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.96725	inf		
0	0	0	0	0	0	0	0	0	0	2.5	-2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.471222	inf	
0	0	0	0	0	0	0	0	0	0	-6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.45192	0.816979



# Two-Phase Simplex Report

Feasible polytope + extreme points + simplex path



State 11/31 | BIG-M step 10 | ENTER: u27 | LEAVE: a15

## COMMENTS

Teaching Mode | Rule: DANTZIG  
Pivot: u27 enters, a15 leaves.  
Reduced cost of entering variable: -1.20517e+08  
Minimum ratio theta\*: 0.17982  
Why this pivot: Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

## TABLEAU

Current solution:  $x_1=2.82613, x_2=4.01902, x_3=2.14707$   
Tableau objective: -1.74859e+08

row	x1	x2	x3	s1	s2	s3	u4	a4	s5	u6	a6	u7	a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	s21	u22	a22	u23	a23	s24	u24	a24	s25	u26	a26	s27	u27	a27	u28	a28	rhs	ratio
R1(s1)	0	0	0	1	0	0	0.328125	-0.328125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1875	0.1875	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.17387	inf	
R2(s2)	0	0	0	0	0	1	-0.078125	0.078125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1875	-0.1875	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.98098	77.3293	
R3(s3)	0	0	0	0	0	0	-0.546875	0.546875	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3125	-0.3125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.85293	57.3268	
R4(u6)	0	0	0	0	0	0	1.09375	-1.09375	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.625	0.625	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.450659	inf
R5(s5)	0	0	0	0	0	0	-2.29687	2.29687	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.95182	5.6371						
R6(s14)	0	0	0	0	0	0	-0.03125	0.03125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.07142	2.3992						
R7(x1)	1	0	0	0	0	0	-0.328125	0.328125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.82613	27.4991						
R8(a8)	0	0	0	0	0	0	-0.390625	0.390625	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.04294	2.19618						
R9(s9)	0	0	0	0	0	0	-0.3125	0.3125	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.67176	6.63658					
R10(a10)	0	0	0	0	0	0	-2.65625	2.65625	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.67045	2.21779						
R11(a11)	0	0	0	0	0	0	-1.15625	1.15625	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.57868	3.579						
R12(a12)	0	0	0	0	0	0	-2.78125	2.78125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.42126	1.55371						
R13(a13)	0	0	0	0	0	0	-0.875	0.875	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.14476	1.56307					
R14(x2)	0	1	0	0	0	0	0.078125	-0.078125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.01902	inf						
R15(u7)	0	0	0	0	0	0	-0.578125	0.578125	0	0	0	0	0	0	0	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.90097	18.5558						
R16(s16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.67389	inf				
R17(a17)	0	0	0	0	0	0	-2.375	2.375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.811072	1.15987					
R18(s18)	0	0	0	0	0	0	-3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.93889	5.56194				
R19(a19)	0	0	0	0	0	0	0.25	-0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0571818	inf					
R20(s20)	0	0	0	0	0	0	0.296875	-0.296875	0</td																																											

# Two-Phase Simplex Report

Feasible polytope + extreme points + simplex path

State 12/31 | BIG-M step 11 | ENTER: u15 | LEAVE: a23

## COMMENTS

Teaching Mode | Rule: DANTZIG  
 Pivot: u15 enters, a23 leaves.  
 Reduced cost of entering variable: -2.03438e+08  
 Minimum ratio theta\*: 0.249056  
 Why this pivot: Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

## TABLEAU

Current solution:  $x_1=2.77943$ ,  $x_2=4.06571$ ,  $x_3=2.2249$   
 Tableau objective: -1.24191e+08

row	x1	x2	x3	s1	s2	s3	u4	a4	s5	u6	a6	u7	a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	u21	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio
R1(s1)	0	0	0	1	0	0	0.130435	-0.130435	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.22057	inf				
R2(s2)	0	0	0	0	1	0	0.119565	-0.119565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.93429	42.5652					
R3(s3)	0	0	0	0	0	1	-0.217391	0.217391	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.7751	31.5294					
R4(u6)	0	0	0	0	0	0	0.434783	-0.434783	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.606319	inf					
R5(s5)	0	0	0	0	0	0	-0.913043	0.913043	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.62494	3.01091					
R6(s14)	0	0	0	0	0	0	0.891304	-0.891304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8535	1.22448					
R7(x1)	1	0	0	0	0	0	-0.130435	0.130435	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.77943	15.0727					
R8(a8)	0	0	0	0	0	0	0.597826	-0.597826	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.809453	1.11247					
R9(s9)	0	0	0	0	0	0	0.478261	-0.478261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.48497	3.56235					
R10(a10)	0	0	0	0	0	0	-0.152174	0.152174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.07894	1.1244					
R11(a11)	0	0	0	0	0	0	-0.293478	0.293478	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.23623	1.87541					
R12(a12)	0	0	0	0	0	0	-0.804348	0.804348	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.954281	0.75806					
R13(a13)	0	0	0	0	0	0	-0.706522	0.706522	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.771172	0.763171					
R14(x2)	0	1	0	0	0	0	-0.119565	0.119565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.06571	inf					
R15(u7)	0	0	0	0	0	0	-0.380435	0.380435	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85427	10.1385					
R16(s16)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.67389	inf			
R17(a17)	0	0	0	0	0	0	-0.793478	0.793478	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.437488	0.540715					
R18(s18)	0	0	0	0	0	0	-0.891304	0.891304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.44078	2.96945					
R19(a19)	0	0	0	0	0	0	0.25	-0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0571818	inf				
R20(s20)	0	0	0	0	0	0	1.02174	-1.02174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.85313	5.85361					
R21(s21)	0	0	0	0	0	0	0.619565	-0.619565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.70391	14.6699					
R22(a22)</																																																	



## **Phase Simplex Report**

## Feasible polytope + extreme points + simplex path State

1 | BIG-M step 13 | ENTER: u4 | LEAVE: a28

Rule: DANTZIG

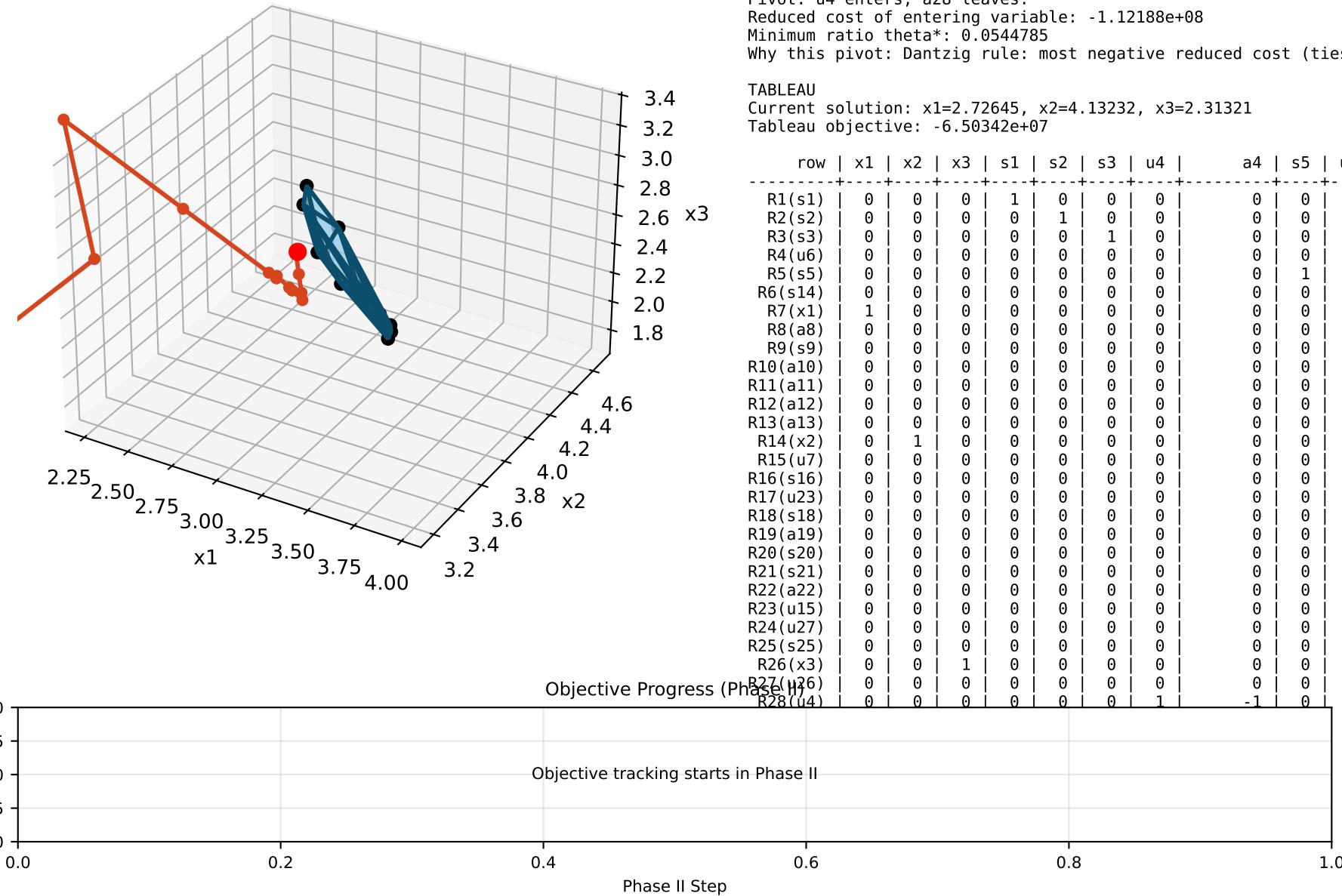
a?8 leaves

entering variable: 1 13188e+08

stat\*: 0.0544785

beta\*: 0.0544/85  
containing rules most negative produced next (tie)

Dantzig rule: most negative reduced cost (tie)

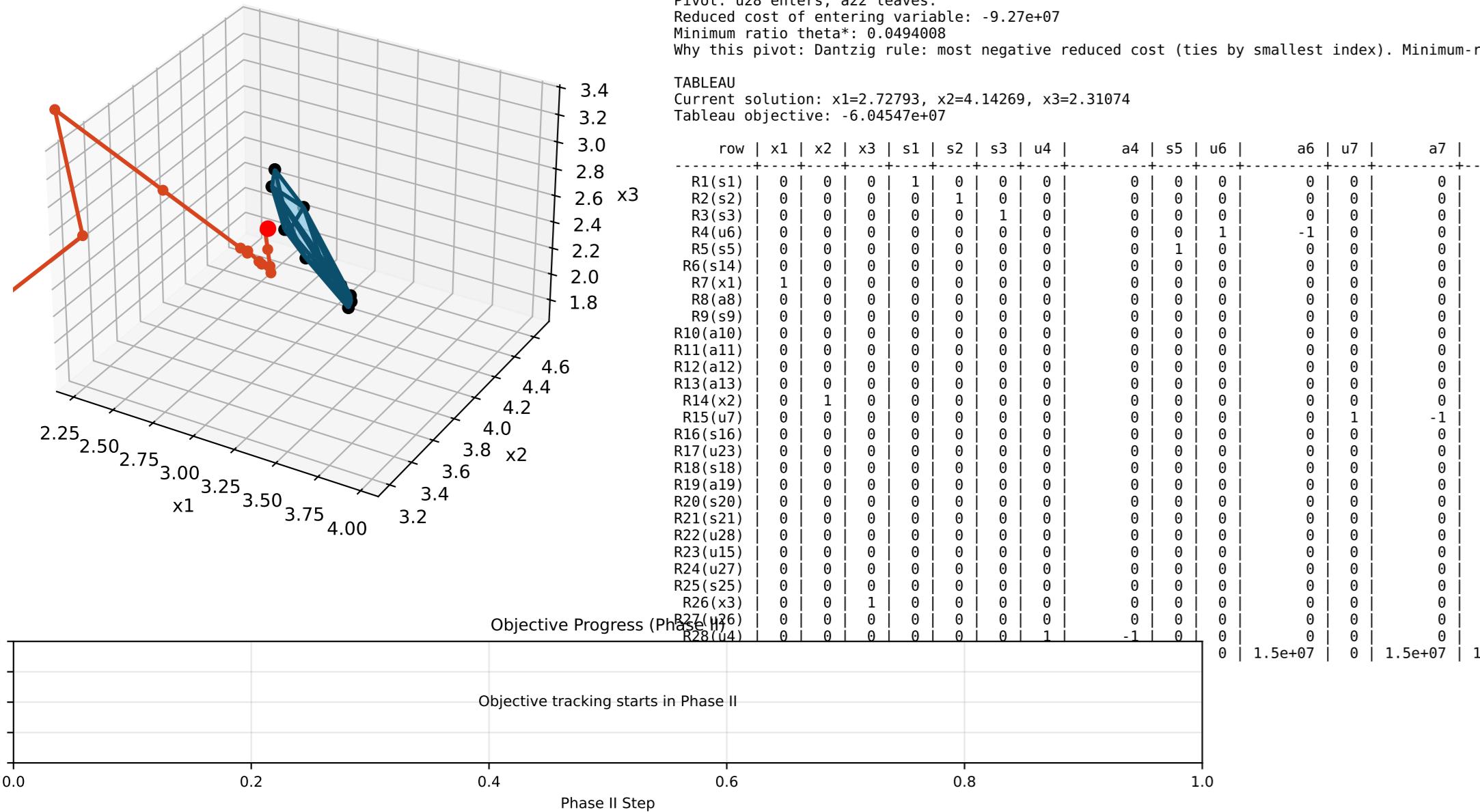


a6	u7	a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	s21	u22	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.15	0.15	0	0	0	0	0	0	0	0.26	-0.26	0	0	0	0	0	0.03	-0.03	9.27355	296.808			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.05	0.05	0	0	0	0	0	0	0	-0.18	0.18	0	0	0	0	0	0.21	-0.21	7.86768	36.021			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	-0.25	0	0	0	0	0	0	0	-0.1	0.1	0	0	0	0	0	-0.05	0.05	9.68679	inf			
-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.5	0.5	0	0	0	0	0	0	0	0.2	-0.2	0	0	0	0	0	0.1	-0.1	0.78293	7.57061			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.05	-1.05	0	0	0	0	0	0	0	0	0.18	-0.18	0	0	0	0	0	-0.21	0.21	3.25405	inf		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.5	0.5	0	0	0	0	0	0	0	-0.4	0.4	0	0	0	0	0	0.13	-0.13	0.524526	0.441821			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.15	-0.15	0	0	0	0	0	0	0	-0.26	0.26	0	0	0	0	0	-0.03	0.03	2.72645	inf			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.25	0.25	0	0	0	0	0	0	0	0.1	-0.1	0	0	0	0	0	1.05	-1.05	0.476438	0.490079			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2	0.2	0	0	0	0	0	0	0	0.28	-0.28	0	0	0	0	0	0.84	-0.84	2.21856	2.58997			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	-0.7	0	0	0	0	0	0	0	-0.48	0.48	0	0	0	0	0	1.06	-1.06	1.3261	1.25547			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	-0.1	0	0	0	0	0	0	0	0.16	-0.16	0	0	0	0	0	0.98	-0.98	1.77959	1.79775			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	-1.1	0	0	0	0	0	0	0	-0.44	0.44	0	0	0	0	0	0.18	-0.18	0.397206	2.17291			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2	0.2	0	0	0	0	0	0	0	-0.52	0.52	0	0	0	0	0	1.44	-1.44	0.251967	0.222456			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05	-0.05	0	0	0	0	0	0	0	0.18	-0.18	0	0	0	0	0	-0.21	0.21	4.13232	inf			
0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.35	-0.35	0	0	0	0	0	0	0	-0.34	0.34	0	0	0	0	0	-0.27	0.27	1.8149	inf			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.67389	inf					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.35	0.35	0	0	0	0	0	0	0	-0.34	0.34	0	0	0	0	0	-0.73	0.73	0.460686	inf			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	-1.2	1	0	0	0	0	0	0	-0.28	0.28	0	0	0	0	0	0.16	-0.16	4.84838	29.1448			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2	0.2	0	-1	1	0	0	0	0	0	0	0.08	-0.08	0	0	0	0	0	0.24	-0.24	0.0435621	0.228727	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.65	0.65	0	0	0	1	0	0	0	-0.14	0.14	0	0	0	0	0	1.33	-1.33	3.57714	2.63647			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.45	0.45	0	0	0	1	0	0	0	-0.02	0.02	0	0	0	0	0	0.69	-0.69	2.61007	3.68588			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.15	0.15	0	0	0	0	1	-1	0	0	-0.34	0.34	0	0	0	0	0	1.23	-1.23	0.060763	0.101903		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	-0.6	0	0	0	0	0	0	0	0.16	-0.16	0	0	0	0	0	-1.52	1.52	0.626972	inf			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.25	0.25	0	0	0	0	0	0	0	0.7	-0.7	0	0	0	0	0	-1.15	1.15	1.22513	inf			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05	-0.05	0	0	0	0	0	0	0	-0.02	0.02	1	0	0	0	0	0	1.19	-1.19	5.58826	4.56266		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.25	0.25	0	0	0	0	0	0	0	0.1	-0.1	0	0	0	0	0	0	0.05	-0.05	2.31321	44.4681		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.7	0.7	0	0	0	0	0	0	0	0	0.48	-0.48	0	1	-1	0	0	-0.06	0.06	1.44257	inf		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	-0.8	0	0	0	0	0	0	0	-0.32	0.32	0	0	0	0	0	0	-0.96	0.96	0.0544785	0.0544785		

## **Use Simplex Report**

Feasible polytope + extreme points + simplex path State 15/31

**COMMENTS**  
Teaching Mode | Rule: DANTZIG  
Pivot: u28 enters, a22 leaves.  
Reduced cost of entering variable: -9.27e+07  
Minimum ratio theta\*: 0.0494008  
Why this pivot: Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by small



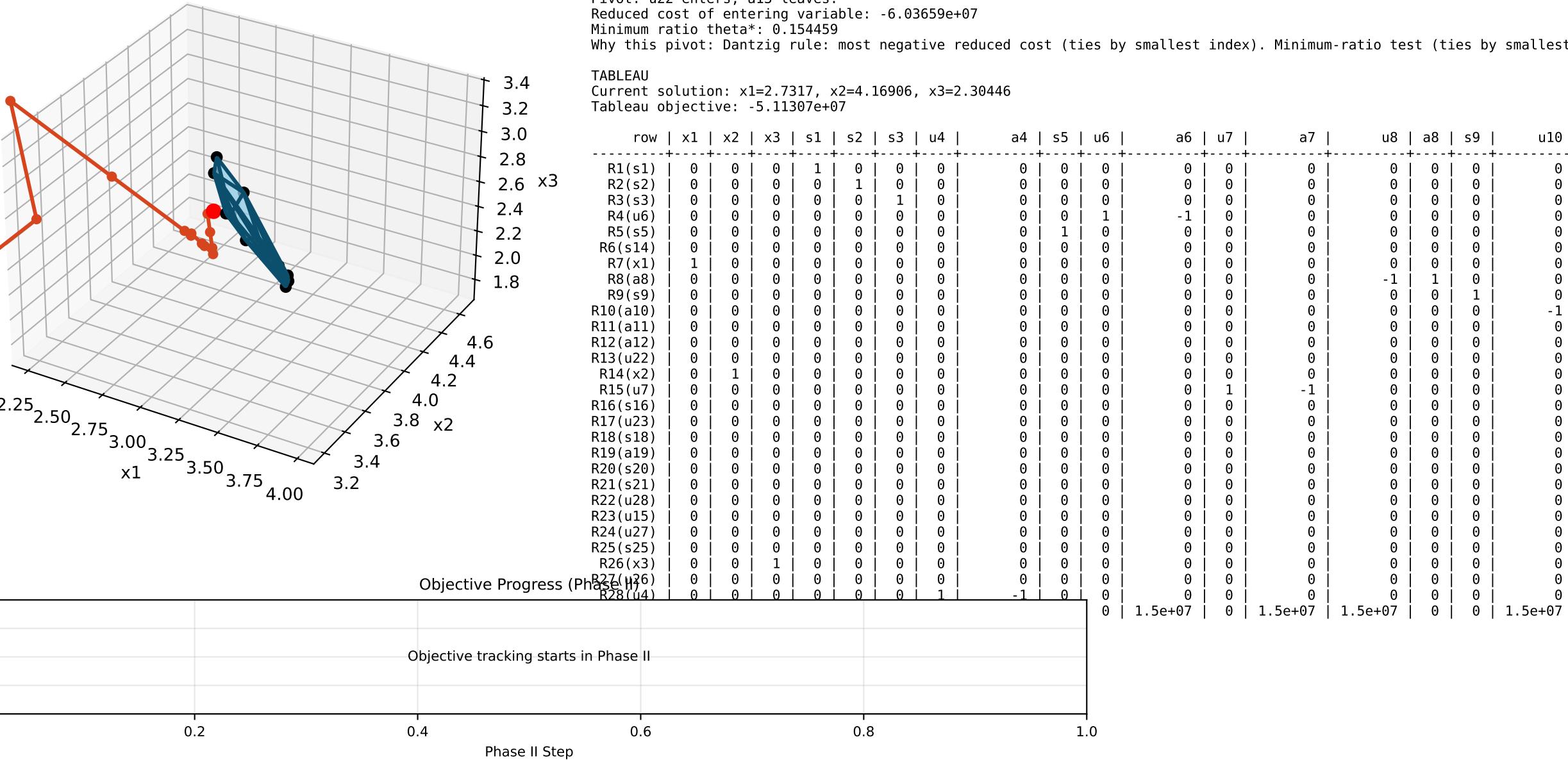
The figure shows a phase diagram with the x-axis labeled "Phase II Step" ranging from 0.2 to 0.8 and the y-axis labeled "alpha" ranging from 0.0 to 1.0. The plot area contains several colored regions representing different phases. A prominent diagonal boundary separates a light blue region above it from a light red region below it. The light blue region is bounded by curves that start at approximately (0.2, 0.4) and end at (0.8, 0.8). The light red region is bounded by curves starting at approximately (0.2, 0.2) and ending at (0.8, 0.6). Other smaller colored regions are visible in the upper right and lower left corners of the plot area.

## **Use Simplex Report**

asible polytope + extreme points + simplex path State 16/31 |

15 | ENTER: u22 | LEAVE: a13

```
TZIG
aves.
variable: -6.03659e+07
54459
ule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).
```

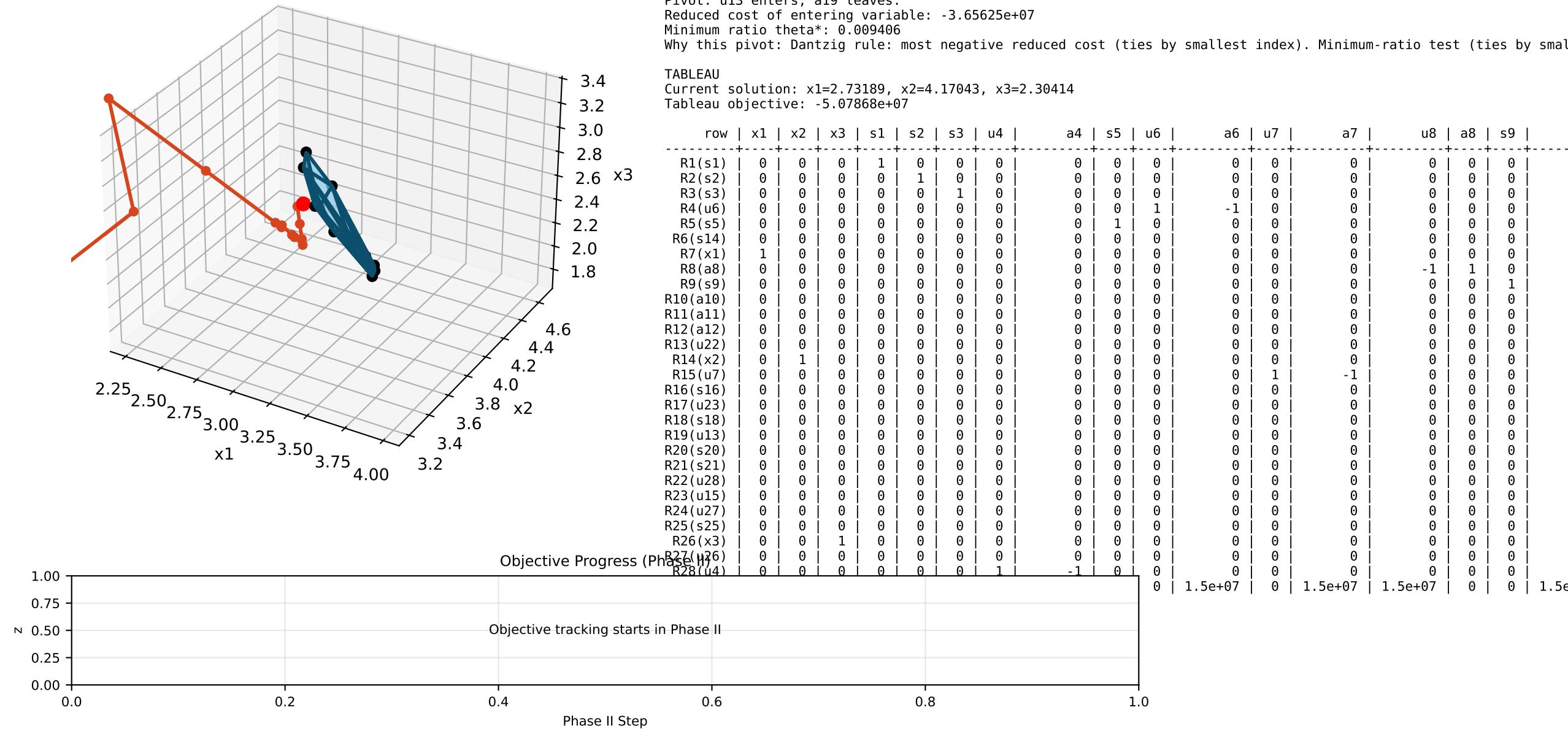


## **Use Simplex Report**

asible polytope + extreme points + simplex path State 17/31 |

ep 16 | ENTER: u13 | LEAVE: a19

```
Rule: DANTZIG
rs, a19 leaves.
  entering variable: -3.65625e+07
theta*: 0.009406
Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).
```



## **Case Simplex Report**

feasible polytope + extreme points + simplex path State 18/31

BIG-M step 17 | ENTER: u19 | LEAVE: s14

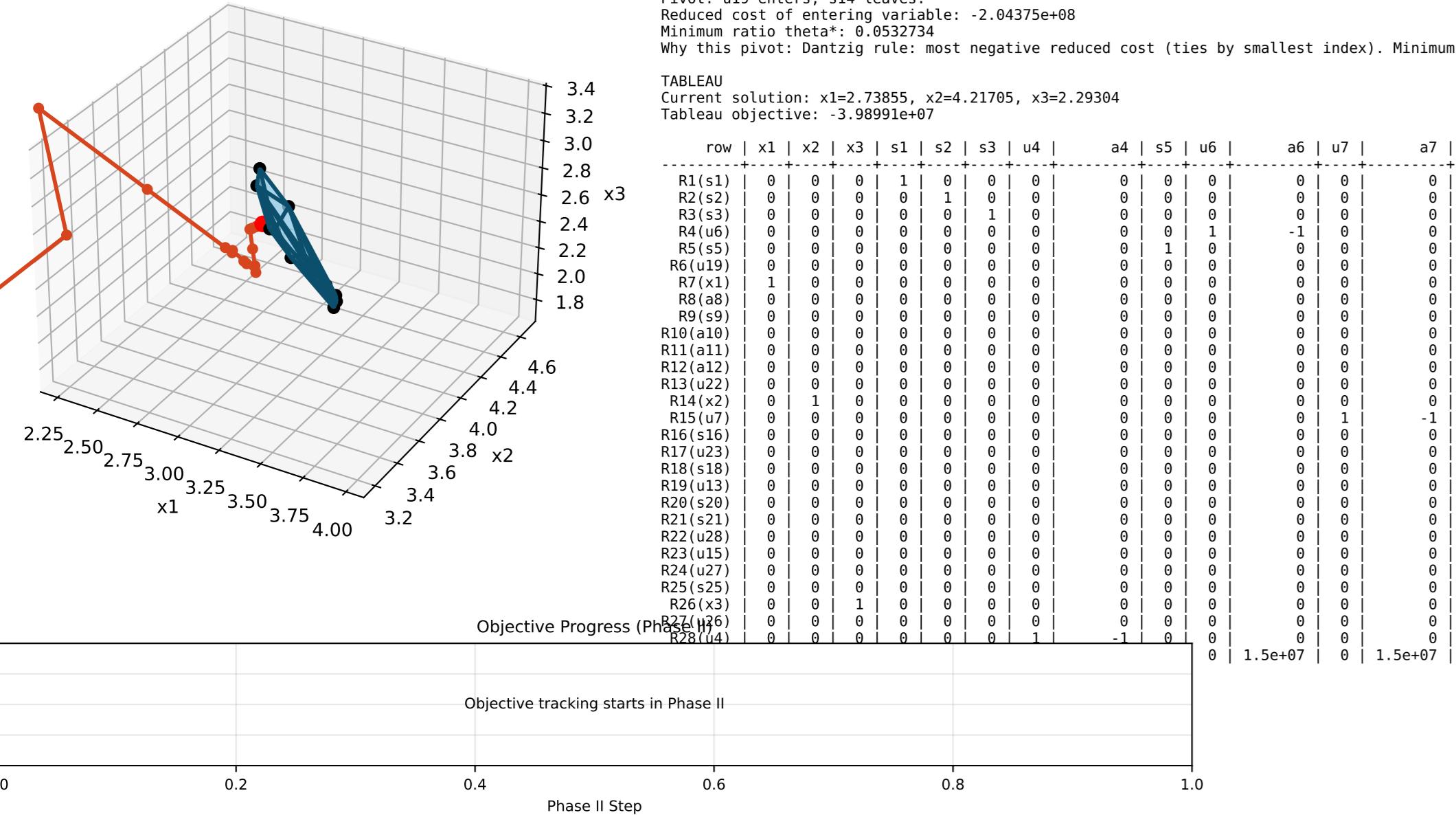
| Rule: DANTZIG

Rate: DANTZIG  
ers s14 leaves

f entering variable: -2.04375e+08

theta\*: 0.0533734

: Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).





## **Case Simplex Report**

feasible polytope + extreme points + simplex path State 20/31

M step 19 | ENTER: u12 | LEAVE: a8

1e: DANTZIG

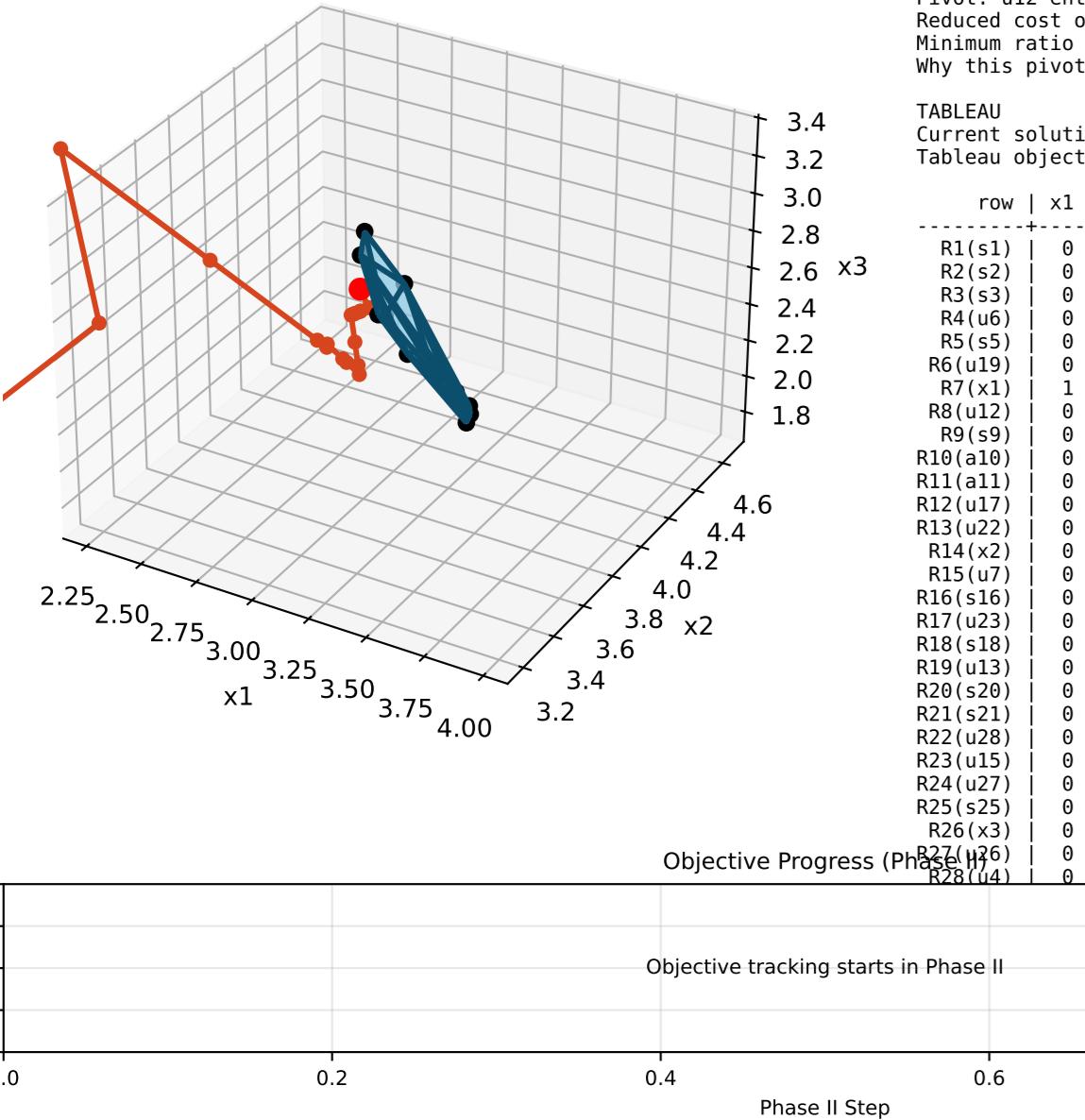
as leaves

tering variable: -2.23026e+07

a\*: 0.0765644

Entzing rule: most negative reduced cost (ties by size)

mitzig rule: most negative reduced cost (ties by smallest index). minimum-ratio test (ties by smallest row index).



## **Case Simplex Report**

feasible polytope + extreme points + simplex path State 21/31

BIG-M step 20 | ENTER: u8 | LEAVE: u19

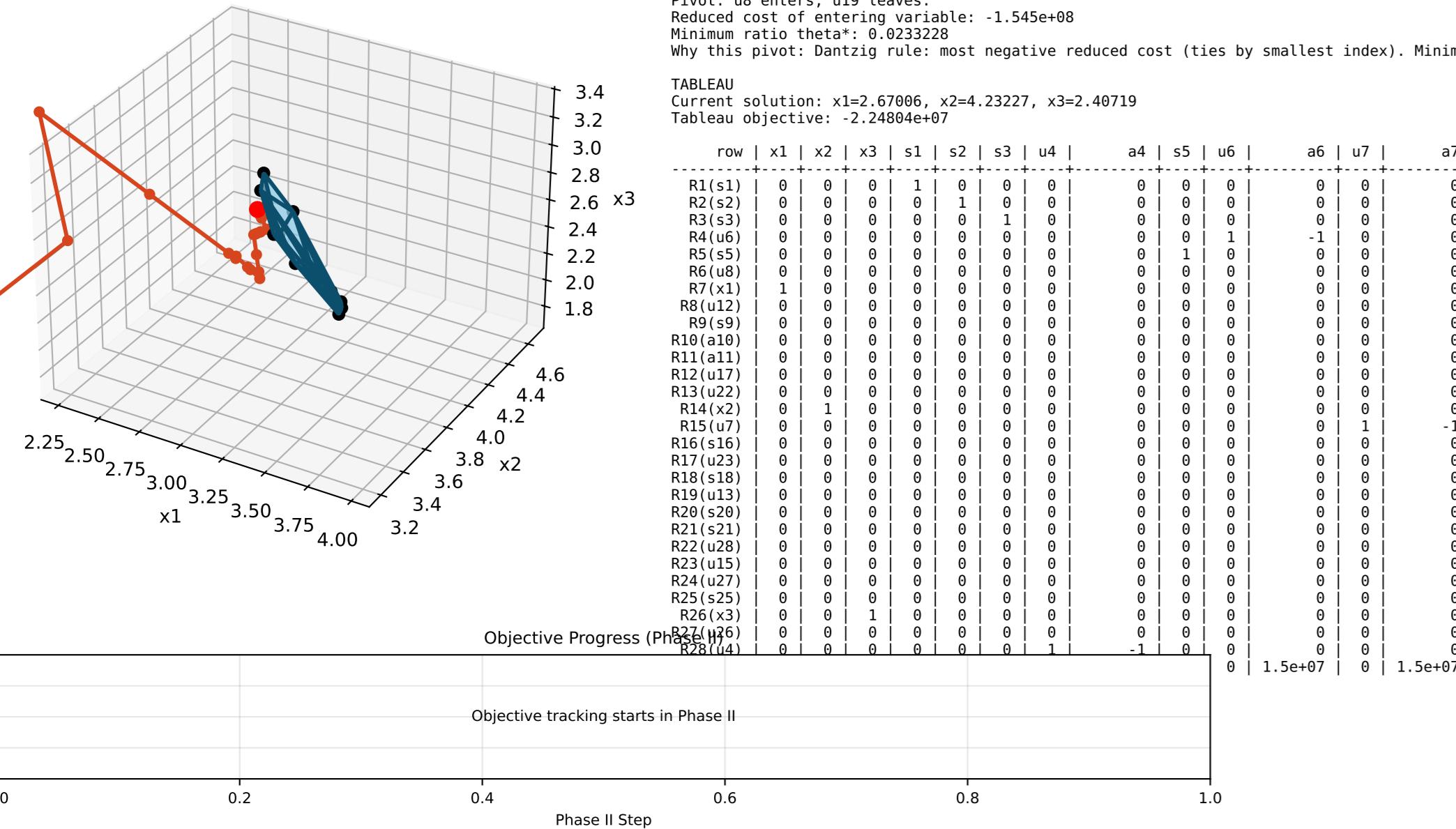
| Rule: DANTZIG

Rate: DANTZIG

of entering variable: 1.545e+08

to enter  
the state\*

: Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).



## **Phase Simplex Report**

asible polytope + extreme points + simplex path State 22/31

M step 21 | ENTER: a19 | LEAVE: a10

ile: DANTZIG

10 leaves

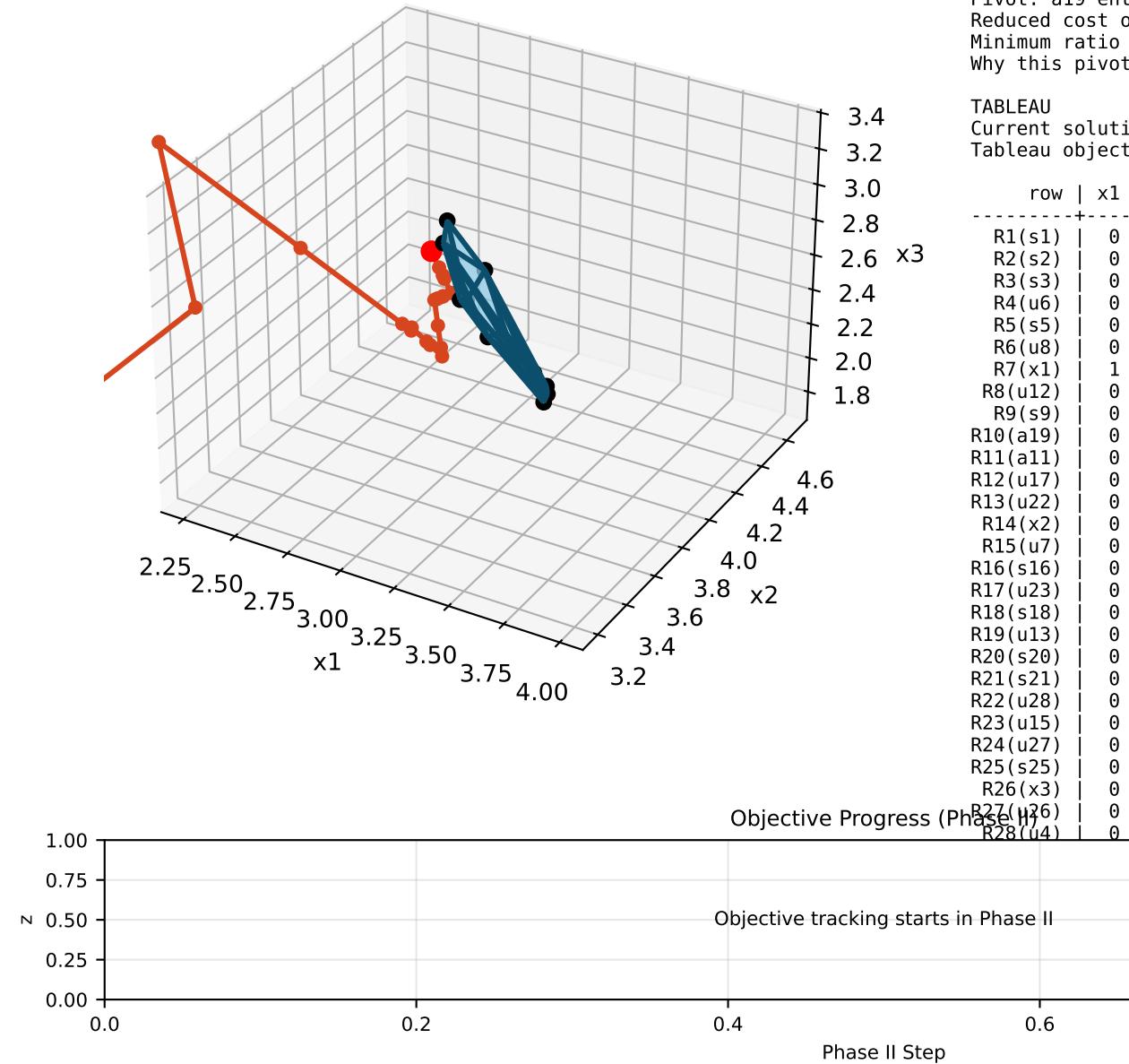
entering variable: 3.05714e+08

Intercept variable: -2.05714e+08  
r2\*: 0.0340715

Kantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

x1=3.62625 x2=4.342 x3=3.4802

$$x_1=2.62625, \quad x_2=4.242, \quad x_3=2.4802$$



## **Phase Simplex Report**

feasible polytope + extreme points + simplex path State 23

**COMMENTS**  
Teaching Mode | Rule: DANTZIG  
Pivot: u24 enters, a19 leaves.  
Reduced cost of entering variable: -1e+07  
Minimum ratio theta\*: 0.245315  
Why this pivot: Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

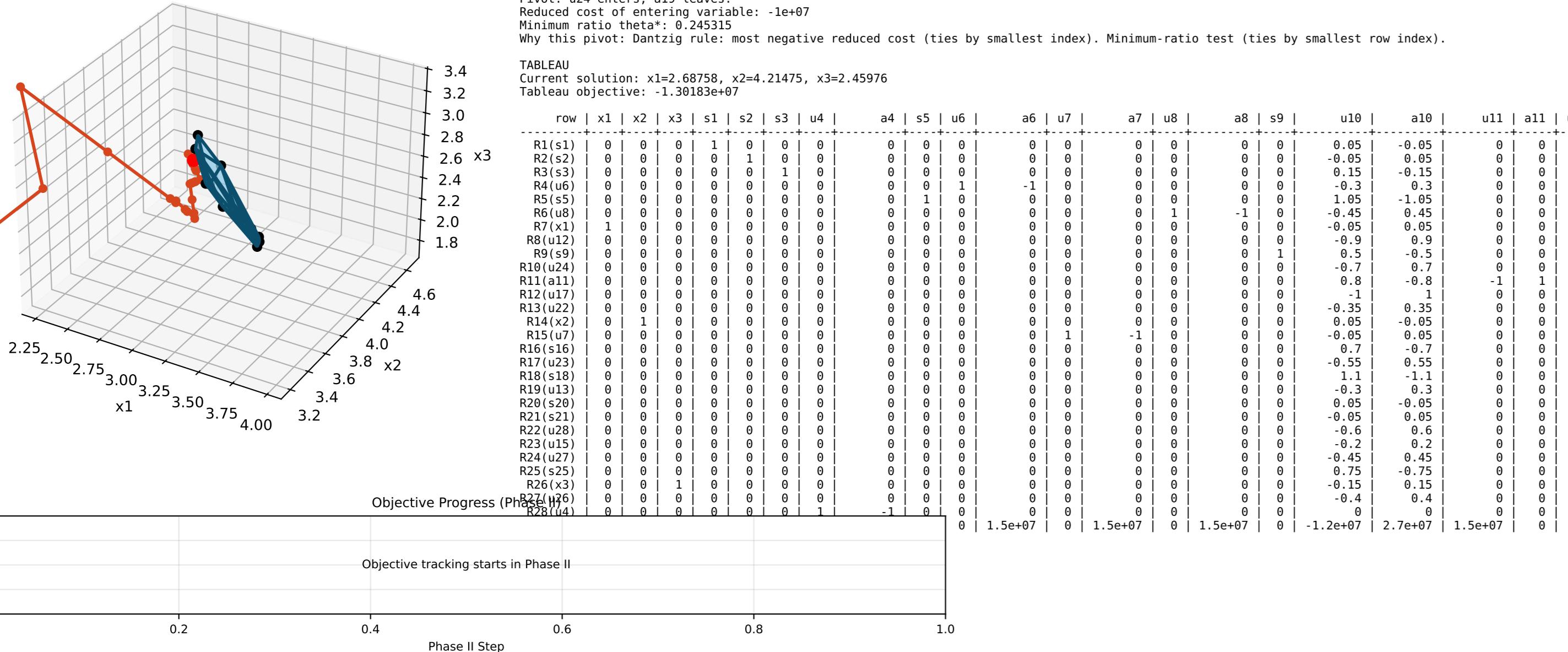


TABLEAU  
Current solution:  $x_1=2.68758$ ,  $x_2=4.21475$ ,  $x_3=2.45976$   
Tableau objective:  $-1.30183e+07$

## **Phase Simplex Report**

Visible polytope + extreme points + simplex path State 24/3

G-M step 23 | ENTER: u19 | LEAVE: a11

Rule: DANTZIG

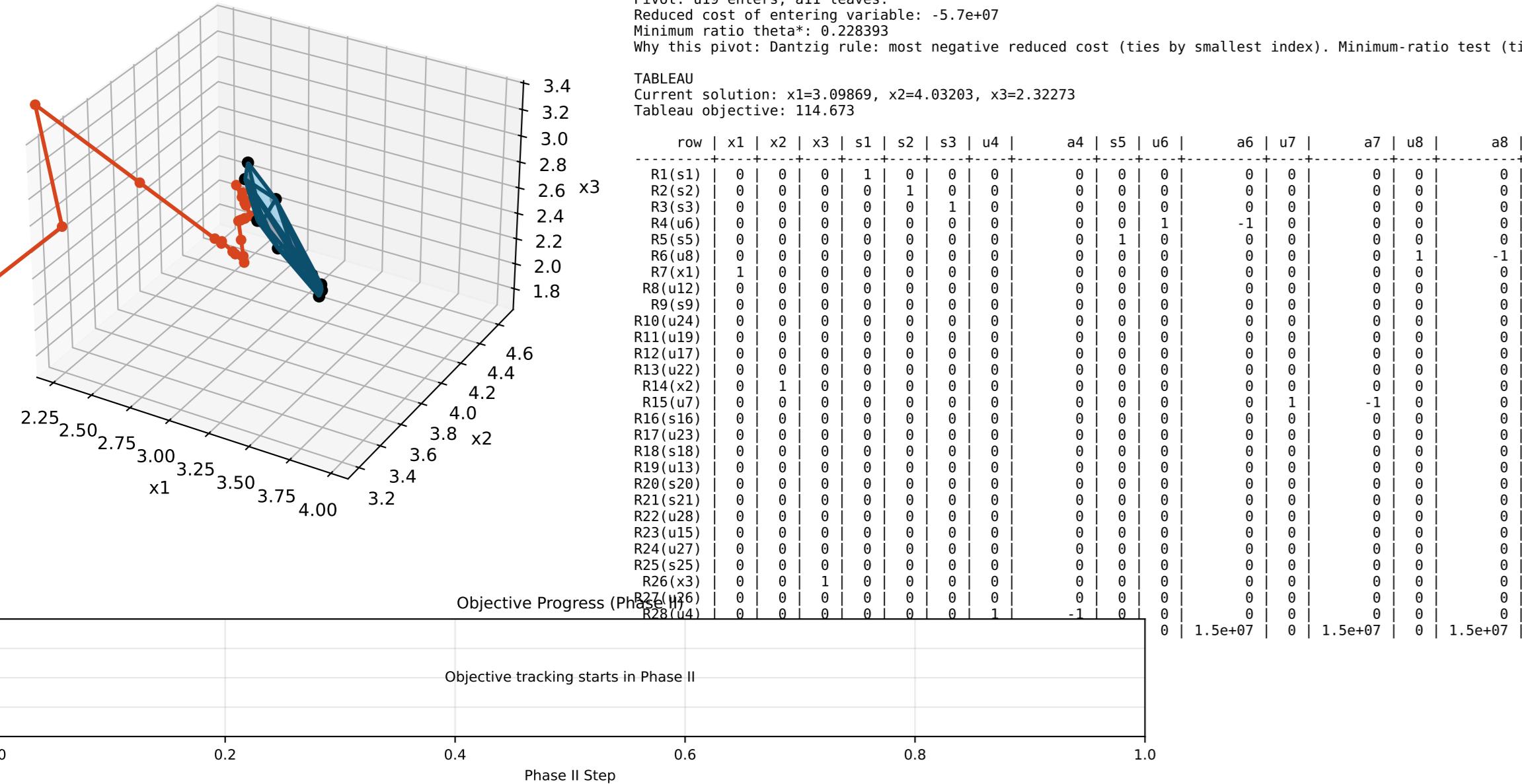
Rate: DANTZIG  
s all leaves

entering variable: -5 Zet+07

eta\*: 0.238393

Dantzig rule: most negative reduced cost (tie)

Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).



# Phase Simplex Report

feasible polytope + extreme points + simplex path State 25

G-M step 24 | ENTER: u11 | LEAVE: u12

| Bul

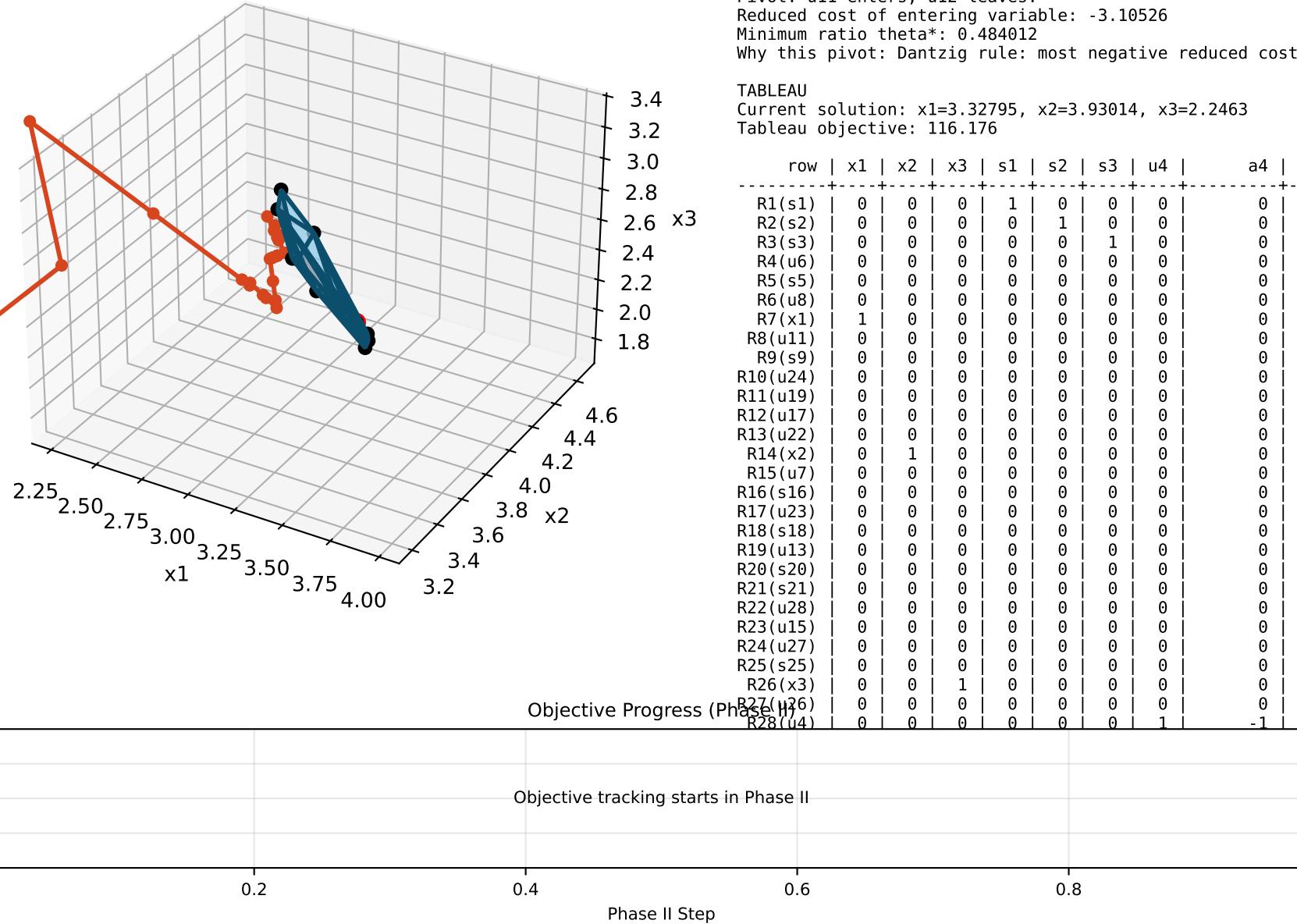
le: DANZIG  
u13 leaves

u12 leaves.

centering variable: -3.10526

$a^*$ : 0.484012

Hentzig rule: most negative m



## **Phase Simplex Report**

possible polytope + extreme points + simplex path State 26/3

-M step 25 | ENTER: u10 | LEAVE: s9

ule: DANTZIG

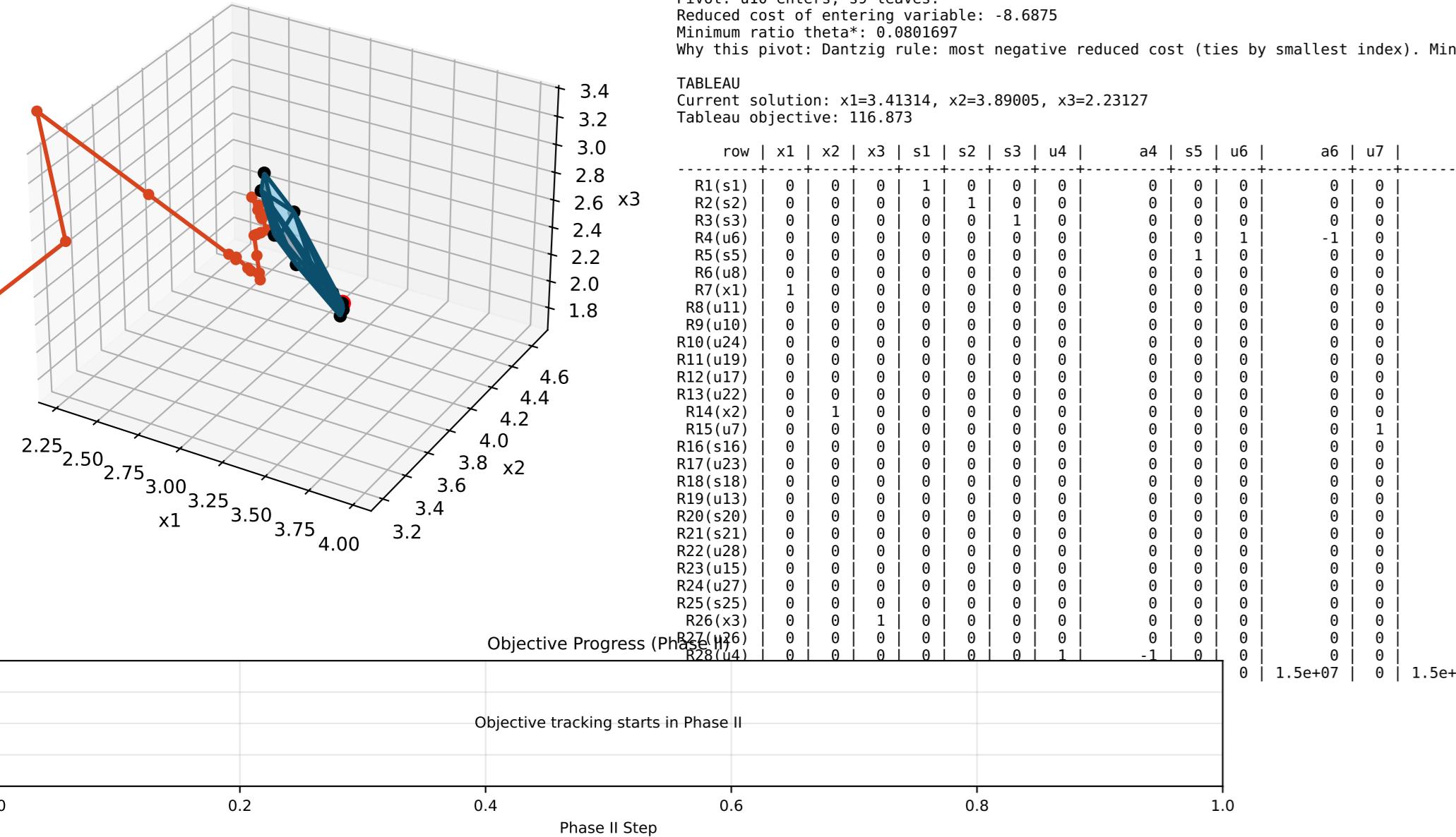
s9 leaves

Entered variable: -8 6875

Intercept Variable: -8.0875  
std: 0.0801697

Kantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

$$x_1=3.41314, \quad x_2=3.89005, \quad$$



a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	s21	u22	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio
0	0	0	-0.386364	0	0	0	0	-0.159091	0.159091	0	0	0.204545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.58686	8.16193	
0	0	0	0.181818	0	0	0	0	0.0454545	-0.0454545	0	0	-0.272727	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.10995	inf		
0	0	0	0.0681818	0	0	0	0	0.204545	-0.204545	0	0	0.0227273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.76873	inf		
0	0	0	-0.136364	0	0	0	0	0.409091	0.409091	0	0	-0.0454545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.619051	1.73097			
0	0	0	-0.75	0	0	0	0	0	0.75	0	0	0	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.619051	1.68562			
0	1	-1	0.818182	0	0	0	0	0	-0.0454545	0.0454545	0	0	0.272727	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.49985	inf		
0	0	0	0.386364	0	0	0	0	0	0.159091	-0.159091	0	0	-0.204545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.41314	inf		
0	0	0	1.06818	0	0	1	-1	-0.295455	0.295455	0	0	0.0227273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.719511	inf			
0	0	0	0.363636	1	-1	0	0	-0.909091	0.909091	0	0	0.454545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0801697	0.0801697			
0	0	0	1.72727	0	0	0	0	0	0.181818	-0.181818	0	0	-1.09091	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.18762	inf		
0	0	0	0.204545	0	0	0	0	0	0.113636	-0.113636	0	0	0.0681818	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.40086	inf			
0	0	0	0.568182	0	0	0	0	0	-0.795455	0.795455	0	0	-0.477273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.32616	inf			
0	0	0	0.25	0	0	0	0	0	-0.25	0.25	0	0	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.986572	inf		
0	0	0	-0.181818	0	0	0	0	0	-0.0454545	0.0454545	0	0	0.272727	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.89005	7.86027		
-1	0	0	0.590909	0	0	0	0	0	0.272727	-0.272727	0	0	-0.136364	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.94601	inf		
0	0	0	-1.72727	0	0	0	0	0	-0.181818	0.181818	0	0	1.09091	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.48626	0.603594	
0	0	0	0.159091	0	0	0	0	0	-0.522727	0.522727	0	0	0.386364	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.22393	inf		
0	0	0	-0.318182	0	0	0	0	0	1.04545	-1.04545	0	0	0.227273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.84643	4.47609	
0	0	0	0.0681818	0	0	0	0	0	-0.295455	0.295455	1	-1	1.02273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.553102	inf
0	0	0	-0.386364	0	0	0	0	0	-0.159091	0.159091	0	0	-0.795455	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.36592	2.30692
0	0	0	-0.227273	0	0	0	0	0	-0.181818	0.181818	0	0	-0.409091	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.96349	3.22176
0	0	0	0.75	0	0	0	0	0	-0.25	0.25	0	0	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.89435	inf
0	0	0	0.522727	0	0	0	0	0	0.0681818	-0.0681818	0	0	0.840909	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.20067	inf
0	0	0	-0.204545	0	0	0	0	0	-0.613636	0.613636	0	0	0.931818	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.50383	2.75365		
0	0	0	-0.886364	0	0	0	0	0	0.340909	-0.340909	0	0	-0.295455	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.33143	1.44691		
0	0	0	-0.0681818	0	0	0	0	0	-0.204545	0.204545	0	0	-0.0227273	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.23127	11.9803		
0	0	0	-0.386364	0	0	0	0	0	-0.659091	0.659091	0	0	0.204545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.954486	0.978509		
0	0	0	0.818182	0	0	0	0	0	0.454545	-0.454545	0	0	0.272727	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.83217	inf	

## **Phase Simplex Report**

feasible polytope + extreme points + simplex path State 27

BIG-M step 26 | ENTER: s14 | LEAVE: u10

Rule: DANTZIG

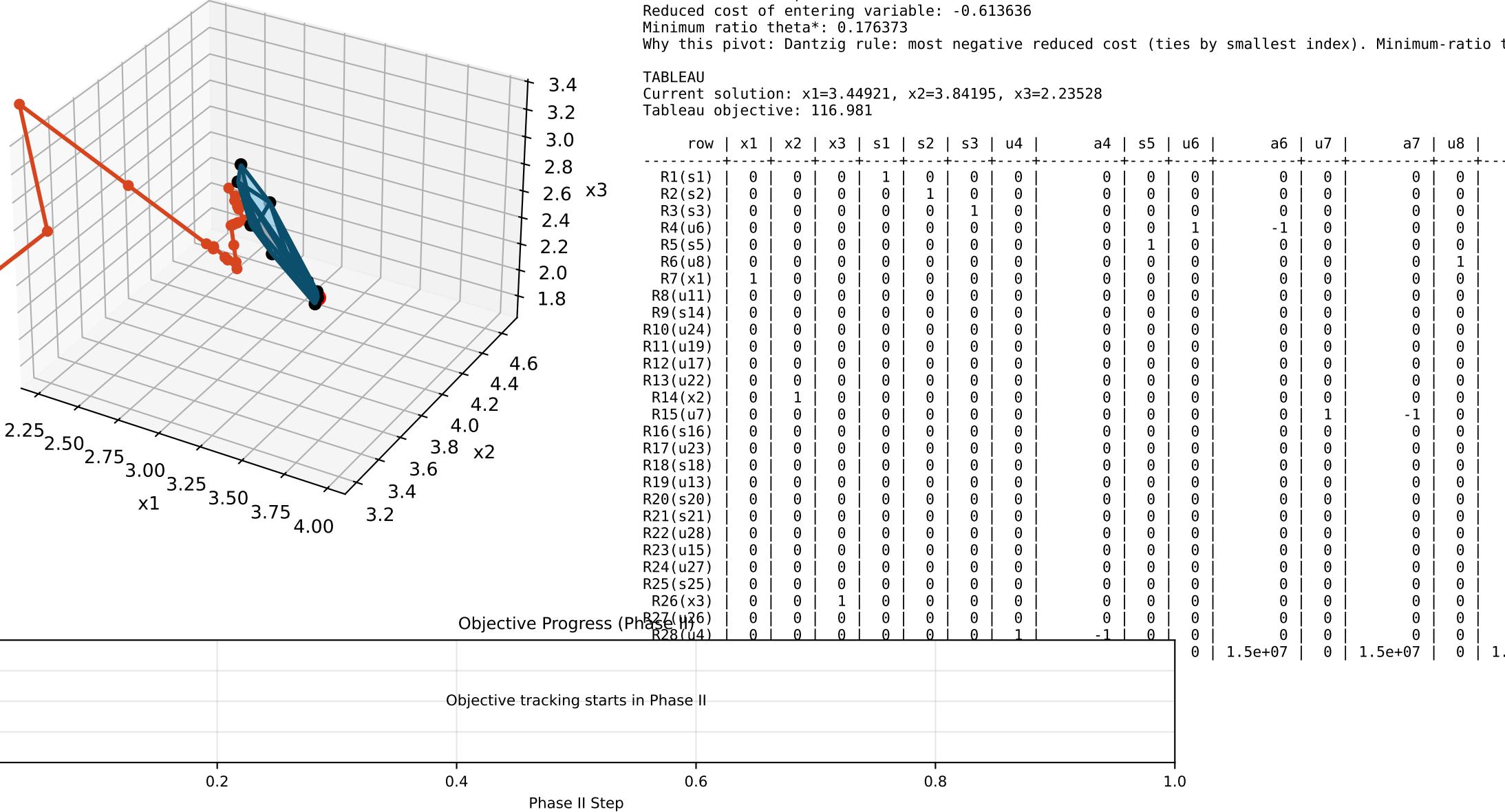
Rate: DANTZIG  
enters 110 leaves

of entering variable: 0.613636

of entering Variable: -0.613636  
t-statistic: 0.176373

$\theta$  theta\*: 0.1/63/3  
at Rantzig rule most negative no

Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).



: x1=3.44921 x2=3.84195 x3=2.23528

negative: 116 981

Active: 110.981																																																
.	x2	x3	s1	s2	s3	u4	a4	s5	u6	a6	u7	a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	u21	a22	u23	a23	u24	a24	s25	u26	a26	u27	a27	u28	a28	rhs	ratio
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-0.55	-0.45	0.45	0	0	0.25	-0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.55079	41.9802						
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	0.6	-0.6	0	0	-0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.15805	inf						
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.05	-0.05	0.05	0	0	0.25	-0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.76472	429.824						
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.1	0.1	-0.1	0	0	-0.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.627068	inf					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	0	0	0	0.25	-2.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.55334	2.2475					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1.35	-1.65	1.65	0	0	0.5	-0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.45175	5.49946					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	-0.6	0.6	0	0	-0.25	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.44921	inf					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05	-0.05	0.05	1	-1	-0.25	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.715502	31.6585						
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	2.2	-2.2	0	0	-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.176373	0.176373					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	2.4	-2.4	0	0	-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.388834	5.87927					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.15	-0.15	0.15	0	0	0.25	-0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.41034	inf					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.95	1.05	-1.05	0	0	-1.75	1.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.854292	1.31543						
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.35	-1.65	1.65	0	0	1.25	-1.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.84195	14.2635					
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.4	-0.6	0.6	0	0	0.5	-0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.97007	inf					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.29386	2.27908			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2.6	-2.4	2.4	0	0	2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.15578	3.16781				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.15	-0.85	0.85	0	0	0.25	-0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.80634	16.9243					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.5	-0.5	0.5	0	0	1.5	-1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.37272	0.540811					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.75	-2.25	2.25	0	0	1.75	-1.75	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.50622	inf					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	1.75	-1.75	0	0	-1.75	1.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.03565	inf					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.55	-0.55	0.55	0	0	0.25	-0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.85026	7.5774					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.15	-1.85	1.85	0	0	1.75	-1.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.05235	2.61701					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.95	-2.05	2.05	0	0	1.25	-1.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.33949	1.61387					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.65	0.65	-0.65	0	0	-0.25	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.38354	inf					
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.05	0.05	-0.05	0	0	-0.25	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.23528	inf					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.55	-0.45	0.45	0	0	-0.25	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.91841	4.66638					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	0	0	0	0.6	-0.6	0.6	0	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.78406	6.71794				

## **Phase Simplex Report**

feasible polytope + extreme points + simplex path State 28/3

| BIG-M step 27 | ENTER: u12 | LEAVE: u13

Rule: DANTZIG

Rate: DANTZIG  
: u13 leaves

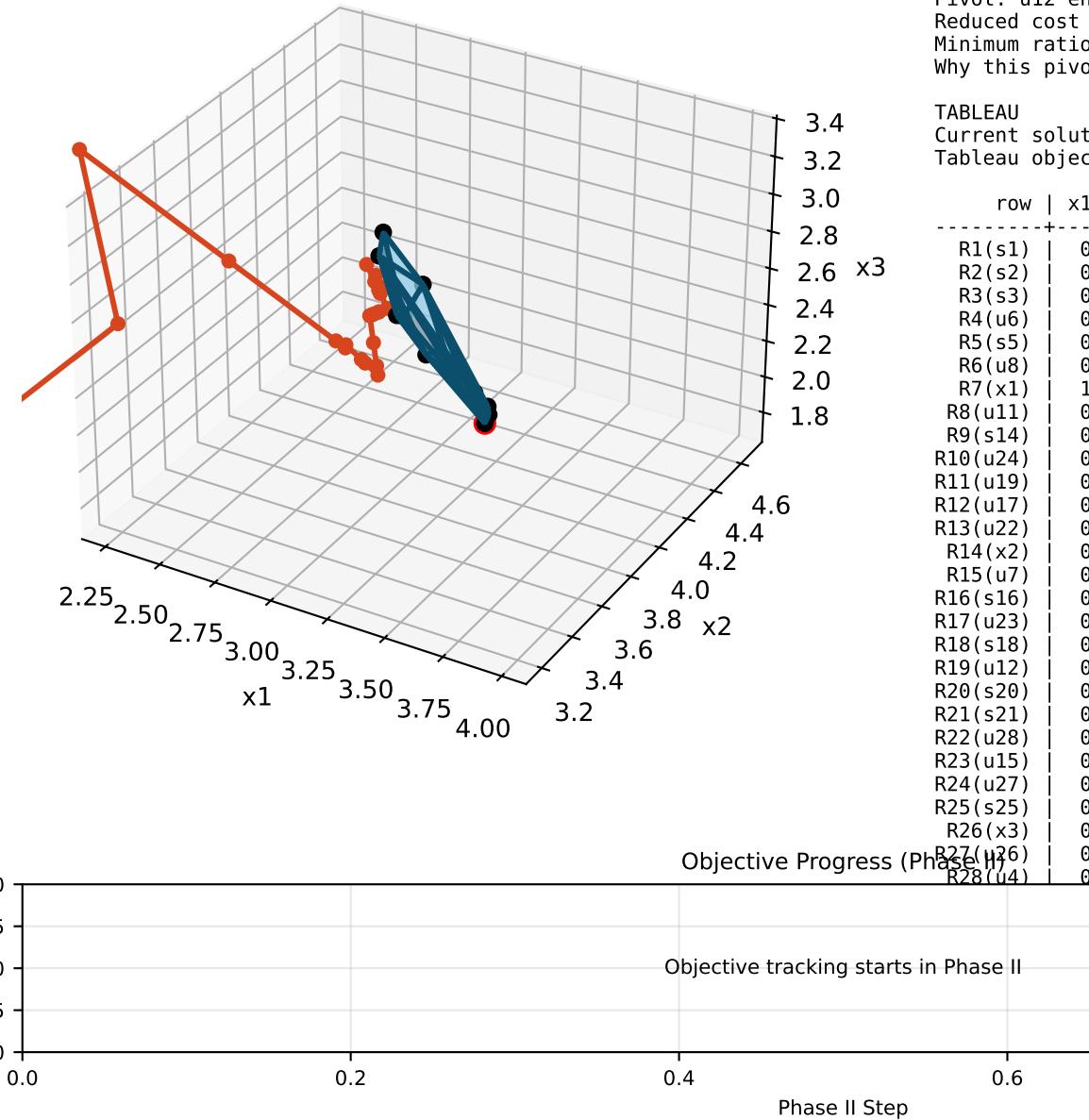
entering variable: 1.75

sigma\*: 0.313083

Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

$$x_1=3.50246, \quad x_2=3.73546, \quad x_3=3.28853$$

$x_1=3.50246$ ,  $x_2=3.73$



## **Phase Simplex Report**

feasible polytope + extreme points + simplex path State 29/

G-M step 28 | ENTER: u10 | LEAVE: s5

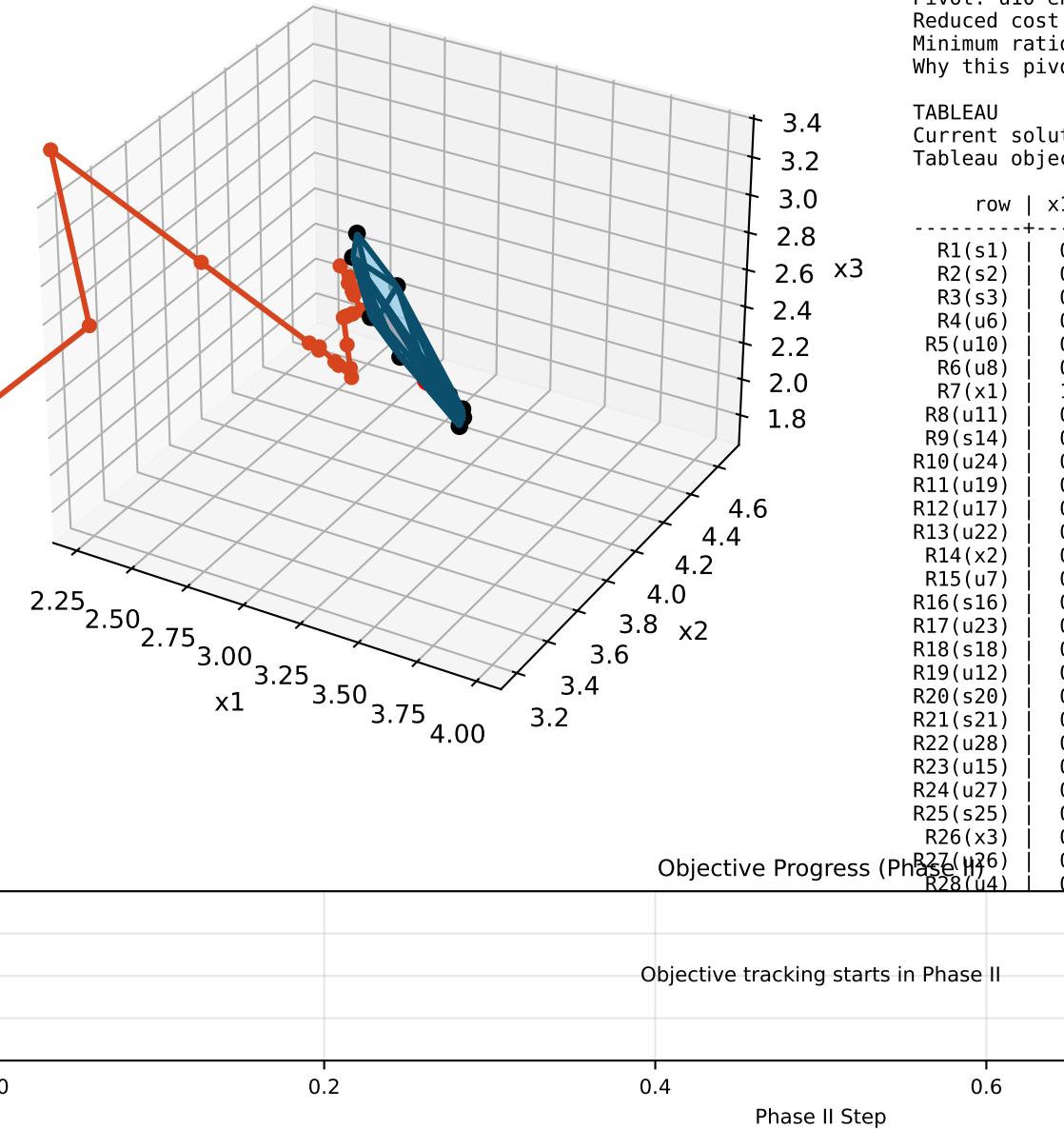
Rule: DANTZIG

s s5 leaves

entering variable: -0.9

eta\*: 0.864244

Dantzig rule: most negative reduced cost (ties by smallest index). Minimum-ratio test (ties by smallest row index).

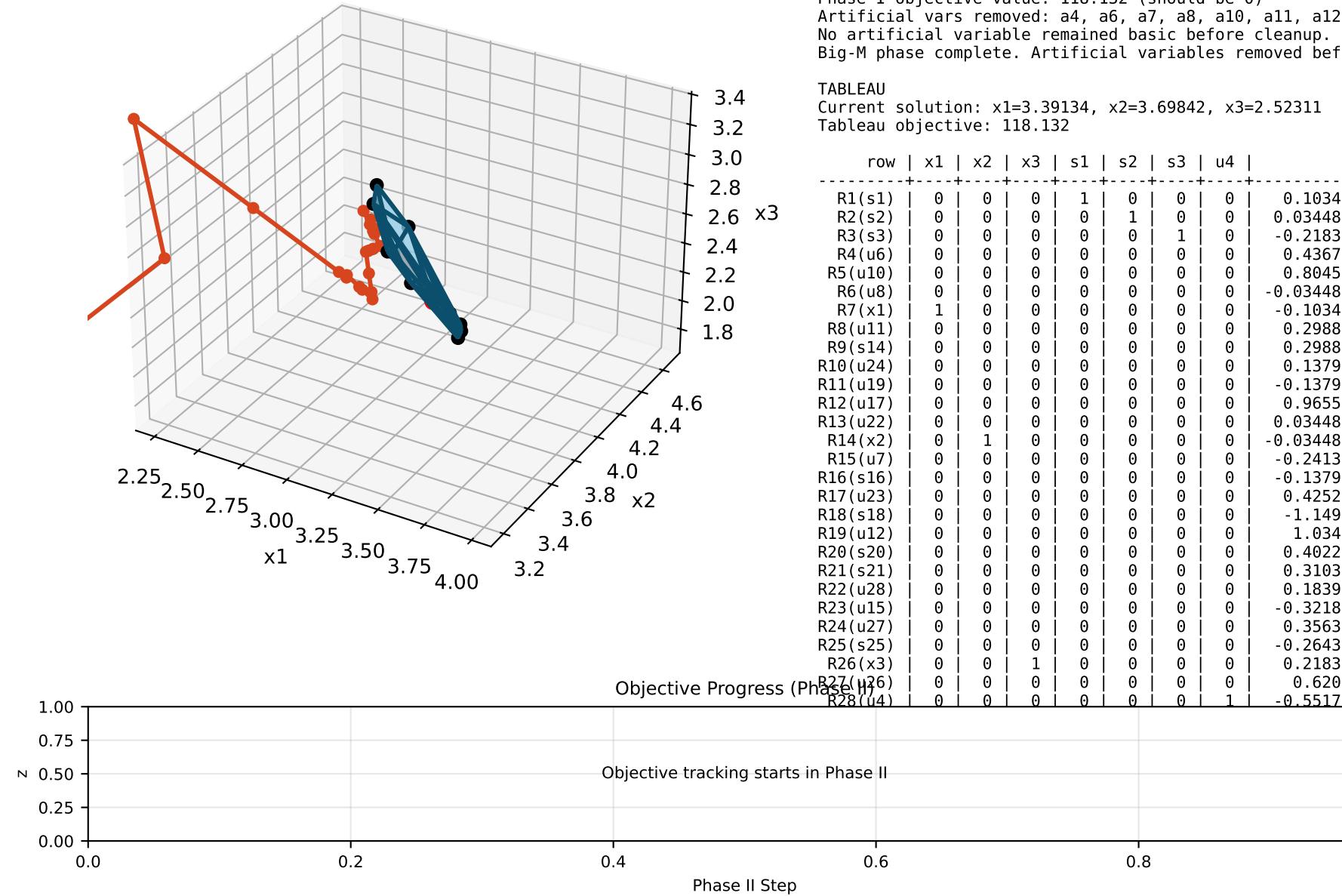


```
: x1=3.39134, x2=3.69842, x3=2.52311  
e: 118.132
```

x2	x3	s1	s2	s3	u4	a4	s5	u6	a6	u7	a7	u8	a8	s9	u10	a10	u11	a11	u12	a12	u13	a13	s14	u15	a15	s16	u17	a17	s18	u19	a19	s20	s21	u22	a22	u23	a23	s24	u25	a26	u27	a27	u28	a28	rhs	ratio
0	0	1	0	0	0	0	0.103448	0	0	0	0	0	-0.482759	0	0	0	0	0	0	-0.275862	0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.60866	inf				
0	0	0	1	0	0	0	0.0344828	0	0	0	0	0	0.172414	0	0	0	0	0	0	0.241379	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.30158	inf					
0	0	0	0	1	0	0	-0.218391	0	0	0	0	0	0.241379	0	0	0	0	0	0	0.137931	-0.137931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.47689	35.7791					
0	0	0	0	0	0	0	0.436782	1	-1	0	0	0	-0.482759	0	0	0	0	0	0	-0.275862	0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	inf						
0	0	0	0	0	0	0	0.804598	0	0	0	0	0	-0.310345	1	-1	0	0	0	0	-1.03448	1.03448	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.864244	0.864244					
0	0	0	0	0	0	0	-0.0344828	0	0	0	0	0	0.827586	0	0	0	0	0	0	-0.241379	0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.30822	31.3894					
0	0	0	0	0	0	0	-0.103448	0	0	0	0	0	0.482759	0	0	0	0	0	0	0.275862	-0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.39134	27.2413					
0	0	0	0	0	0	0	0.298851	0	0	0	0	0	0.827586	0	0	0	1	-1	0	0	-0.241379	0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.08975	inf					
0	0	0	0	0	0	0	0.298851	0	0	0	0	0	-0.172414	0	0	0	0	0	0	0.758621	-0.758621	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.923344	inf					
0	0	0	0	0	0	0	0.137931	0	0	0	0	0	1.68966	0	0	0	0	0	0	0.965517	-0.965517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.95415	inf					
0	0	0	0	0	0	0	-0.137931	0	0	0	0	0	0.310345	0	0	0	0	0	0	0.0344828	-0.0344828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.187432	1.9576					
0	0	0	0	0	0	0	0.965517	0	0	0	0	0	-0.172414	0	0	0	0	0	0	-0.241379	0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.82015	inf					
0	0	0	0	0	0	0	0.0344828	0	0	0	0	0	0.172414	0	0	0	0	0	0	-0.758621	0.758621	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.625103	inf					
1	0	0	0	0	0	0	-0.0344828	0	0	0	0	0	-0.172414	0	0	0	0	0	0	-0.241379	0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.69842	87.1607					
0	0	0	0	0	0	0	-0.241379	0	0	1	-1	0	0.793103	0	0	0	0	0	0	0.310345	-0.310345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.71079	9.90022					
0	0	0	0	0	0	0	-0.137931	0	0	0	0	0	-1.68966	0	0	0	0	0	0	0.965517	0.965517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.71974	10.896					
0	0	0	0	0	0	0	0.425287	0	0	0	0	0	-0.206897	0	0	0	0	0	0	0.689655	0.689655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.55935	inf					
0	0	0	0	0	0	0	-1.14943	0	0	0	0	0	0.586207	0	0	0	0	0	0	0.62069	-0.62069	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.25224	2.44081					
0	0	0	0	0	0	0	1.03448	0	0	0	0	0	-0.827586	0	0	0	0	0	0	0.482759	-0.482759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.32415	inf					
0	0	0	0	0	0	0	0.402299	0	0	0	0	0	-0.655172	0	0	0	0	0	0	0	0.482759	-0.482759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.31106	inf				
0	0	0	0	0	0	0	0.310345	0	0	0	0	0	-0.448276	0	0	0	0	0	0	0.172414	-0.172414	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.58198	inf					
0	0	0	0	0	0	0	0.183908	0	0	0	0	0	0.586207	0	0	0	0	0	0	-0.37931	0.37931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.99455	inf					
0	0	0	0	0	0	0	-0.321839	0	0	0	0	0	0.724138	0	0	0	0	0	0	-0.586207	0.586207	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.33394	4.19909					
0	0	0	0	0	0	0	0.356322	0	0	0	0	0	-0.551724	0	0	0	0	0	0	-1.17241	1.17241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.45599	inf					
0	0	0	0	0	0	0	-0.264368	0	0	0	0	0	-0.655172	0	0	0	0	0	0	0.482759	-0.482759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.15282	10.4598					
0	1	0	0	0	0	0	0.218391	0	0	0	0	0	-0.241379	0	0	0	0	0	0	-0.137931	0.137931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.52311	inf					
0	0	0	0	0	0	0	0.62069	0	0	0	0	0	-0.896552	0	0	0	0	0	0	-0.655172	0.655172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.63836	inf					
0	0	0	0	0	0	0	-0.551724	0	0	0	0	0	1.24138	0	0	0	0	0	0	0.137931	-0.137931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.978457	2.29116					

# Two-Phase Simplex Report

Feasible polytope + extreme points + simplex path



State 30/31 | BIG-M -> PHASE II step 0

## COMMENTS

Teaching Mode | Phase Transition

Phase I objective value: 118.132 (should be 0)

Artificial vars removed: a4, a6, a7, a8, a10, a11, a12, a13, a15, a17, a19, a22, a23, a24, a26, a27, a28

No artificial variable remained basic before cleanup.

Big-M phase complete. Artificial variables removed before restoring original objective.

## TABLEAU

Current solution:  $x_1=3.39134$ ,  $x_2=3.69842$ ,  $x_3=2.52311$

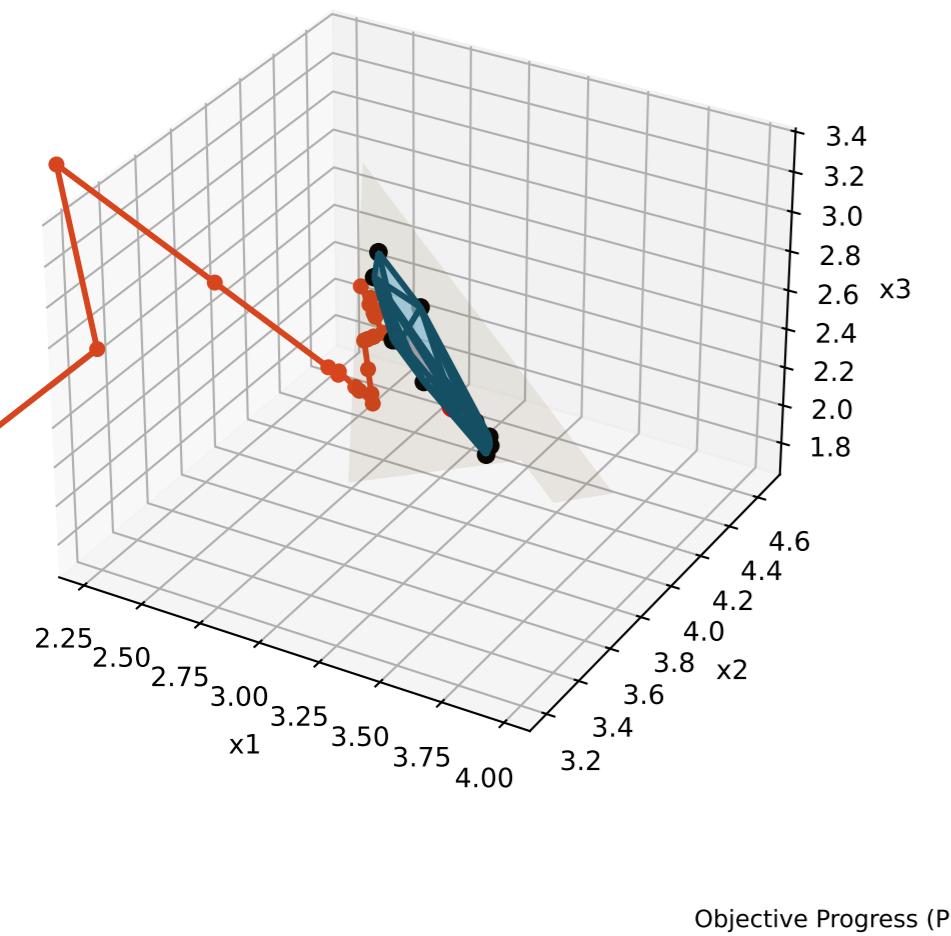
Tableau objective: 118.132

row	$x_1$	$x_2$	$x_3$	$s_1$	$s_2$	$s_3$	$u_4$	$s_5$	$u_6$	$u_7$	$u_8$	$s_9$	$u_{10}$	$u_{11}$	$u_{12}$	$u_{13}$	$s_{14}$	$u_{15}$	$s_{16}$	$u_{17}$	$s_{18}$	$u_{19}$	$s_{20}$	$s_{21}$	$u_{22}$	$u_{23}$	$u_{24}$	$s_{25}$	$u_{26}$	$u_{27}$	$u_{28}$	rhs	ratio	
R1( $s_1$ )	0	0	0	1	0	0	0	0.103448	0	0	0	-0.482759	0	0	0	-0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.60866	inf		
R2( $s_2$ )	0	0	0	0	1	0	0	0.0344828	0	0	0	0.172414	0	0	0	0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.30158	inf		
R3( $s_3$ )	0	0	0	0	0	1	0	-0.218391	0	0	0	0.241379	0	0	0	0.137931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.47689	inf		
R4( $u_6$ )	0	0	0	0	0	0	0	0.436782	1	0	0	-0.482759	0	0	0	-0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.20272	inf		
R5( $u_{10}$ )	0	0	0	0	0	0	0	0.804598	0	0	0	-0.310345	1	0	0	-1.03448	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.864244	inf		
R6( $u_8$ )	0	0	0	0	0	0	0	-0.0344828	0	0	1	0.827586	0	0	0	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.30822	inf		
R7( $x_1$ )	1	0	0	0	0	0	0	-0.103448	0	0	0	0.482759	0	0	0	0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.39134	inf		
R8( $u_{11}$ )	0	0	0	0	0	0	0	0.298851	0	0	0	0.827586	0	1	0	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.08975	inf		
R9( $s_{14}$ )	0	0	0	0	0	0	0	0.298851	0	0	0	-0.172414	0	0	0	0.758621	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.923344	inf		
R10( $u_{24}$ )	0	0	0	0	0	0	0	0.137931	0	0	0	1.68966	0	0	0	0.965517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.95415	inf		
R11( $u_{19}$ )	0	0	0	0	0	0	0	-0.137931	0	0	0	0.310345	0	0	0	0.0344828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.187432	inf		
R12( $u_{17}$ )	0	0	0	0	0	0	0	0	0.965517	0	0	-0.172414	0	0	0	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.82015	inf	
R13( $u_{22}$ )	0	0	0	0	0	0	0	0.0344828	0	0	0	0.172414	0	0	0	-0.758621	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.625103	inf	
R14( $x_2$ )	0	1	0	0	0	0	0	-0.0344828	0	0	0	-0.172414	0	0	0	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.69842	inf	
R15( $u_7$ )	0	0	0	0	0	0	0	-0.241379	0	1	0	0.793103	0	0	0	0.310345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.71079	inf	
R16( $s_{16}$ )	0	0	0	0	0	0	0	-0.137931	0	0	0	-1.68966	0	0	0	-0.965517	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1.71974	inf	
R17( $u_{23}$ )	0	0	0	0	0	0	0	0.425287	0	0	0	-0.206897	0	0	0	-0.689655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.55935	inf	
R18( $s_{18}$ )	0	0	0	0	0	0	0	-1.14943	0	0	0	0.586207	0	0	0	0.62069	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.25224	inf
R19( $u_{12}$ )	0	0	0	0	0	0	0	1.03448	0	0	0	-0.827586	0	0	0	-0.758621	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.32415	inf
R20( $s_{20}$ )	0	0	0	0	0	0	0	0.402299	0	0	0	-0.655172	0	0	0	0.482759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.31106	inf
R21( $s_{21}$ )	0	0	0	0	0	0	0	0.310345	0	0	0	-0.448276	0	0	0	0.172414	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.58198	inf
R22( $u_{28}$ )	0	0	0	0	0	0	0	0.183908	0	0	0	0.586207	0	0	0	-0.37931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.99455	inf
R23( $u_{15}$ )	0	0	0	0	0	0	0	-0.321839	0	0	0	0.724138	0	0	0	-0.586207	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.33394	inf
R24( $u_{27}$ )	0	0	0	0	0	0	0	0.356322	0	0	0	-0.551724	0	0	0	-1.17241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.45599	inf
R25( $s_{25}$ )	0	0	0	0	0	0	0	-0.264368	0	0	0	-0.655172	0	0	0	0.482759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.15282	inf
R26( $x_3$ )	0	0	1	0	0	0	0	0.218391	0	0	0	-0.241379	0	0	0	-0.137931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.52311	inf
R27( $s_{26}$ )	0</																																	

# Two-Phase Simplex Report

Feasible polytope + extreme points + simplex path

$$15x_1 + 10x_2 + 12x_3 = 118$$



State 31/31 | PHASE II step 0 | Z=118.132

## COMMENTS

Teaching Mode | PHASE II

Original objective restored after Big-M cleanup.

## TABLEAU

Current solution:  $x_1=3.39134, x_2=3.69842, x_3=2.52311$

Objective z: 118.132

row	x1	x2	x3	s1	s2	s3	u4	s5	u6	u7	u8	s9	u10	u11	u12	u13	s14	u15	s16	u17	s18	u19	s20	u21	u22	s23	u24	s25	u26	u27	u28	rhs	ratio	
R1(s1)	0	0	0	1	0	0	0	0.103448	0	0	0	-0.482759	0	0	0	-0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.60866	inf		
R2(s2)	0	0	0	0	1	0	0	0.0344828	0	0	0	0.172414	0	0	0	0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.30158	inf		
R3(s3)	0	0	0	0	0	1	0	-0.218391	0	0	0	0.241379	0	0	0	0.137931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.47689	inf		
R4(u6)	0	0	0	0	0	0	0	0.436782	1	0	0	-0.482759	0	0	0	-0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.20272	inf		
R5(u10)	0	0	0	0	0	0	0	0.804598	0	0	0	-0.310345	1	0	0	-1.03448	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.864244	inf		
R6(u8)	0	0	0	0	0	0	0	-0.0344828	0	0	1	0.827586	0	0	0	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.30822	inf		
R7(x1)	1	0	0	0	0	0	0	-0.103448	0	0	0	0.482759	0	0	0	0.275862	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.39134	inf		
R8(u11)	0	0	0	0	0	0	0	0.298851	0	0	0	0.827586	0	1	0	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.08975	inf		
R9(s14)	0	0	0	0	0	0	0	0.298851	0	0	0	-0.172414	0	0	0	0.758621	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.923344	inf	
R10(u24)	0	0	0	0	0	0	0	0.137931	0	0	0	1.68966	0	0	0	0.965517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.95415	inf	
R11(u19)	0	0	0	0	0	0	0	-0.137931	0	0	0	0.310345	0	0	0	0.0344828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.187432	inf	
R12(u17)	0	0	0	0	0	0	0	0.965517	0	0	0	-0.172414	0	0	0	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.82015	inf	
R13(u22)	0	0	0	0	0	0	0	0.0344828	0	0	0	0.172414	0	0	0	-0.758621	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.625103	inf	
R14(x2)	0	1	0	0	0	0	0	-0.0344828	0	0	0	-0.172414	0	0	0	-0.241379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.69842	inf	
R15(u7)	0	0	0	0	0	0	0	-0.241379	0	1	0	0.793103	0	0	0	0.310345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.71079	inf	
R16(s16)	0	0	0	0	0	0	0	-0.137931	0	0	0	-1.68966	0	0	0	-0.965517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.71974	inf	
R17(u23)	0	0	0	0	0	0	0	0.425287	0	0	0	-0.206897	0	0	0	-0.689655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.55935	inf	
R18(s18)	0	0	0	0	0	0	0	-1.14943	0	0	0	0.586207	0	0	0	0.62069	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.25224	inf
R19(u12)	0	0	0	0	0	0	0	1.03448	0	0	0	-0.827586	0	1	0	-0.758621	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.32415	inf	
R20(s20)	0	0	0	0	0	0	0	0.402299	0	0	0	-0.655172	0	0	0	0.482759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.31106	inf	
R21(s21)	0	0	0	0	0	0	0	0.310345	0	0	0	-0.448276	0	0	0	0.172414	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.58198	inf	
R22(u28)	0	0	0	0	0	0	0	0.183908	0	0	0	0.586207	0	0	0	-0.37931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.99455	inf	
R23(u15)	0	0	0	0	0	0	0	-0.321839	0	0	0	0.724138	0	0	0	-0.586207	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.33394	inf	
R24(u27)	0	0	0	0	0	0	0	0.356322	0	0	0	-0.551724	0	0	0	-1.17241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.45599	inf		
R25(s25)	0	0	0	0	0	0	0	-0.264368	0	0	0	-0.655172	0	0	0	0.482759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.15282	inf	
R26(x3)	0	0	1	0	0	0	0	0.218391	0	0	0	-0.241379	0	0	0	-0.137931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.52311	inf	
R27(u26)	0	0	0	0	0	0	0	0.62069	0	0	0	-0.896552	0	0	0	-0.655172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.63836	inf	
R28(u4)	0	0	0	0	0	0	1	-0.551724	0	0	0	1.24138	0	0	0	0.137931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.978457	inf	
Rz	0	0	0	0	0	0	0	0.724138	0	0	0	2.62069	0	0	0	0.0689655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118.132	-	

