# MPS 文件数学模型提取

完整版

MPS Extractor

2025 年 7 月 8 日

## 目录

# 1 模型概览

**文件名:** `ran12x21.mps`
**模型名:** RAN12X21
**变量总数:** 504
**约束总数:** 285
**优化方向:** Minimize

# 2 目标函数

**目标函数摘要:**

$$\min \quad Z = \sum_i c_i Y_i + \sum_j d_j X_j \tag{1}$$

Y 变量: 252 个，系数范围 [67, 263]
X 变量: 252 个，系数范围 [1, 10]
**完整目标函数:**

$$\begin{aligned}
\min \quad Z = {} & 102Y_{250} + 225Y_0 + 91Y_1 && (2)\\
& + 203Y_2 + 179Y_3 + 233Y_4 && (3)\\
& + 77Y_5 + 240Y_6 + 147Y_7 && (4)\\
& + 180Y_8 + 227Y_9 + 200Y_{10} && (5)\\
& + 87Y_{11} + 263Y_{12} + 250Y_{13} && (6)\\
& + 121Y_{14} + 101Y_{15} + 156Y_{16} && (7)\\
& + 170Y_{17} + 219Y_{18} + 189Y_{19} && (8)\\
& + 102Y_{20} + 187Y_{21} + 170Y_{22} && (9)\\
& + 132Y_{23} + 171Y_{24} + 81Y_{25} && (10)\\
& + 112Y_{26} + 157Y_{27} + 172Y_{28} && (11)\\
& + 167Y_{29} + 206Y_{30} + 76Y_{31} && (12)\\
& + 105Y_{32} + 84Y_{33} + 242Y_{34} && (13)\\
& + 143Y_{35} + 170Y_{36} + 212Y_{37} && (14)\\
& + 91Y_{38} + 246Y_{39} + 196Y_{40} && (15)\\
& + 91Y_{41} + 123Y_{42} + 202Y_{43} && (16)\\
& + 237Y_{44} + 81Y_{45} + 136Y_{46} && (17)\\
& + 199Y_{47} + 162Y_{48} + 244Y_{49} && (18)\\
& + 98Y_{50} + 157Y_{51} + 220Y_{52} && (19)\\
& + 196Y_{53} + 68Y_{54} + 183Y_{55} && (20)\\
& + 117Y_{56} + 122Y_{57} + 150Y_{58} && (21)\\
& + 137Y_{59} + 170Y_{60} + 70Y_{61} && (22)\\
& + 136Y_{62} + 238Y_{63} + 112Y_{64} && (23)\\
& + 147Y_{65} + 152Y_{66} + 110Y_{67} && (24)\\
& + 73Y_{68} + 253Y_{69} + 135Y_{70} && (25)
\end{aligned}$$

$$+ 98Y_{71} + 88Y_{72} + 102Y_{73} \tag{26}$$

$$+ 196Y_{74} + 117Y_{75} + 133Y_{76} \tag{27}$$

$$+ 94Y_{77} + 204Y_{78} + 116Y_{79} \tag{28}$$

$$+ 132Y_{80} + 208Y_{81} + 256Y_{82} \tag{29}$$

$$+ 213Y_{83} + 73Y_{84} + 175Y_{85} \tag{30}$$

$$+ 202Y_{86} + 260Y_{87} + 234Y_{88} \tag{31}$$

$$+ 119Y_{89} + 214Y_{90} + 79Y_{91} \tag{32}$$

$$+ 157Y_{92} + 202Y_{93} + 263Y_{94} \tag{33}$$

$$+ 102Y_{95} + 113Y_{96} + 165Y_{97} \tag{34}$$

$$+ 226Y_{98} + 102Y_{99} + 192Y_{100} \tag{35}$$

$$+ 93Y_{101} + 69Y_{102} + 219Y_{103} \tag{36}$$

$$+ 112Y_{104} + 154Y_{105} + 107Y_{106} \tag{37}$$

$$+ 190Y_{107} + 139Y_{108} + 88Y_{109} \tag{38}$$

$$+ 125Y_{110} + 104Y_{111} + 97Y_{112} \tag{39}$$

$$+ 149Y_{113} + 134Y_{114} + 203Y_{115} \tag{40}$$

$$+ 84Y_{116} + 177Y_{117} + 118Y_{118} \tag{41}$$

$$+ 210Y_{119} + 83Y_{120} + 161Y_{121} \tag{42}$$

$$+ 169Y_{122} + 241Y_{123} + 168Y_{124} \tag{43}$$

$$+ 181Y_{125} + 127Y_{126} + 162Y_{127} \tag{44}$$

$$+ 237Y_{128} + 175Y_{129} + 92Y_{130} \tag{45}$$

$$+ 189Y_{131} + 104Y_{132} + 225Y_{133} \tag{46}$$

$$+ 225Y_{134} + 259Y_{135} + 129Y_{136} \tag{47}$$

$$+ 137Y_{137} + 226Y_{138} + 71Y_{139} \tag{48}$$

$$+ 258Y_{140} + 245Y_{141} + 204Y_{142} \tag{49}$$

$$+ 71Y_{143} + 79Y_{144} + 67Y_{145} \tag{50}$$

$$+ 234Y_{146} + 144Y_{147} + 185Y_{148} \tag{51}$$

$$+ 234Y_{149} + 127Y_{150} + 112Y_{151} \tag{52}$$

$$+ 81Y_{152} + 206Y_{153} + 154Y_{154} \tag{53}$$

$$+ 97Y_{155} + 91Y_{156} + 161Y_{157} \tag{54}$$

$$+ 189Y_{158} + 117Y_{159} + 196Y_{160} \tag{55}$$

$$+ 177Y_{161} + 148Y_{162} + 259Y_{163} \tag{56}$$

$$+ 93Y_{164} + 219Y_{165} + 202Y_{166} \tag{57}$$

$$+ 131Y_{167} + 123Y_{168} + 238Y_{169} \tag{58}$$

$$+ 77Y_{170} + 86Y_{171} + 71Y_{172} \tag{59}$$

$$+ 227Y_{173} + 109Y_{174} + 217Y_{175} \tag{60}$$

$$+ 115Y_{176} + 147Y_{177} + 247Y_{178} \tag{61}$$

$$+ 258Y_{179} + 129Y_{180} + 178Y_{181} \tag{62}$$

$$+ 125Y_{182} + 217Y_{183} + 241Y_{184} \tag{63}$$

$$+ 228Y_{185} + 106Y_{186} + 261Y_{187} \tag{64}$$

$$+ 132Y_{188} + 147Y_{189} + 148Y_{190} \tag{65}$$

$$+ 72Y_{191} + 187Y_{192} + 110Y_{193} \tag{66}$$

$$+ 128Y_{194} + 96Y_{195} + 207Y_{196} \tag{67}$$

$$+ 203Y_{197} + 217Y_{198} + 158Y_{199} \tag{68}$$

$$+ 129Y_{200} + 225Y_{201} + 178Y_{202} \tag{69}$$

$$+ 103Y_{203} + 73Y_{204} + 153Y_{205} \tag{70}$$

$$+ 161Y_{206} + 238Y_{207} + 91Y_{208} \tag{71}$$

$$+ 101Y_{209} + 123Y_{210} + 76Y_{211} \tag{72}$$

$$+ 78Y_{212} + 154Y_{213} + 149Y_{214} \tag{73}$$

$$+ 97Y_{215} + 119Y_{216} + 146Y_{217} \tag{74}$$

$$+ 94Y_{218} + 76Y_{219} + 183Y_{220} \tag{75}$$

$$+ 122Y_{221} + 178Y_{222} + 178Y_{223} \tag{76}$$

$$+ 106Y_{224} + 130Y_{225} + 168Y_{226} \tag{77}$$

$$+ 121Y_{227} + 136Y_{228} + 160Y_{229} \tag{78}$$

$$+ 162Y_{230} + 259Y_{231} + 167Y_{232} \tag{79}$$

$$+ 260Y_{233} + 167Y_{234} + 120Y_{235} \tag{80}$$

$$+ 177Y_{236} + 104Y_{237} + 95Y_{238} \tag{81}$$

$$+ 177Y_{239} + 95Y_{240} + 216Y_{241} \tag{82}$$

$$+ 242Y_{242} + 263Y_{243} + 130Y_{244} \tag{83}$$

$$+ 195Y_{245} + 153Y_{246} + 209Y_{247} \tag{84}$$

$$+ 135Y_{248} + 250Y_{249} + 193Y_{251} \tag{85}$$

$$+ 1X_0 + 1X_1 + 7X_2 \tag{86}$$

$$+ 7X_3 + 7X_4 + 10X_5 \tag{87}$$

$$+ 10X_6 + 10X_7 + 9X_8 \tag{88}$$

$$+ 9X_9 + 5X_{10} + 9X_{11} \tag{89}$$

$$+ 2X_{12} + 3X_{13} + 8X_{14} \tag{90}$$

$$+ 8X_{15} + 2X_{16} + 10X_{17} \tag{91}$$

$$+ 7X_{18} + 4X_{19} + 9X_{20} \tag{92}$$

$$+ 4X_{21} + 10X_{22} + 1X_{23} \tag{93}$$

$$+ 1X_{24} + 3X_{25} + 10X_{26} \tag{94}$$

$$+ 2X_{27} + 2X_{28} + 7X_{29} \tag{95}$$

$$+ 9X_{30} + 10X_{31} + 5X_{32} \tag{96}$$

$$+ 6X_{33} + 9X_{34} + 2X_{35} \tag{97}$$

$$+ 10X_{36} + 5X_{37} + 3X_{38} \tag{98}$$

$$+ 4X_{39} + 2X_{40} + 3X_{41} \tag{99}$$

$$+ 10X_{42} + 4X_{43} + 1X_{44} \tag{100}$$

$$+ 3X_{45} + 10X_{46} + 1X_{47} \tag{101}$$

$$+ 8X_{48} + 8X_{49} + 6X_{50} \tag{102}$$

$$+ 2X_{51} + 7X_{52} + 2X_{53} \tag{103}$$

$$+ 4X_{54} + 2X_{55} + 5X_{56} \tag{104}$$

$$+ 9X_{57} + 7X_{58} + 6X_{59} \tag{105}$$

$$+ 10X_{60} + 4X_{61} + 9X_{62} \tag{106}$$

$$+ 1X_{63} + 10X_{64} + 10X_{65} \tag{107}$$

$$+ 5X_{66} + 7X_{67} + 8X_{68} \tag{108}$$

$$+ 10X_{69} + 10X_{70} + 6X_{71} \tag{109}$$

$$+ 10X_{72} + 9X_{73} + 2X_{74} \tag{110}$$

$$+ 5X_{75} + 2X_{76} + 5X_{77} \tag{111}$$

$$+ 7X_{78} + 4X_{79} + 2X_{80} \tag{112}$$

$$+ 9X_{81} + 7X_{82} + 5X_{83} \tag{113}$$

$$+ 8X_{84} + 4X_{85} + 4X_{86} \tag{114}$$

$$+ 4X_{87} + 3X_{88} + 1X_{89} \tag{115}$$

$$+ 3X_{90} + 2X_{91} + 1X_{92} \tag{116}$$

$$+ 8X_{93} + 2X_{94} + 9X_{95} \tag{117}$$

$$+ 10X_{96} + 6X_{97} + 2X_{98} \tag{118}$$

$$+ 3X_{99} + 7X_{100} + 5X_{101} \tag{119}$$

$$+ 4X_{102} + 7X_{103} + 10X_{104} \tag{120}$$

$$+ 4X_{105} + 4X_{106} + 7X_{107} \tag{121}$$

$$+ 7X_{108} + 10X_{109} + 7X_{110} \tag{122}$$

$$+ 1X_{111} + 8X_{112} + 7X_{113} \tag{123}$$

$$+ 9X_{114} + 7X_{115} + 7X_{116} \tag{124}$$

$$+ 5X_{117} + 1X_{118} + 2X_{119} \tag{125}$$

$$+ 5X_{120} + 8X_{121} + 9X_{122} \tag{126}$$

$$+ 8X_{123} + 9X_{124} + 9X_{125} \tag{127}$$

$$+ 4X_{126} + 7X_{127} + 1X_{128} \tag{128}$$

$$+ 4X_{129} + 1X_{130} + 5X_{131} \tag{129}$$

$$+ 1X_{132} + 2X_{133} + 2X_{134} \tag{130}$$

$$+ 5X_{135} + 5X_{136} + 7X_{137} \tag{131}$$

$$+ 2X_{138} + 6X_{139} + 6X_{140} \tag{132}$$

$$+ 6X_{141} + 6X_{142} + 6X_{143} \tag{133}$$

$$+ 3X_{144} + 3X_{145} + 4X_{146} \tag{134}$$

$$+ 1X_{147} + 1X_{148} + 4X_{149} \tag{135}$$

$$+ 8X_{150} + 10X_{151} + 3X_{152} \tag{136}$$

$$+ 9X_{153} + 4X_{154} + 8X_{155} \tag{137}$$

$$+ 3X_{156} + 9X_{157} + 5X_{158} \tag{138}$$

$$+ 5X_{159} + 2X_{160} + 5X_{161} \tag{139}$$

$$+ 8X_{162} + 5X_{163} + 4X_{164} \tag{140}$$

$$+ 6X_{165} + 4X_{166} + 1X_{167} \tag{141}$$

$$+ 10X_{168} + 1X_{169} + 10X_{170} \tag{142}$$

$$+ 7X_{171} + 6X_{172} + 9X_{173} \tag{143}$$
$$+ 7X_{174} + 10X_{175} + 3X_{176} \tag{144}$$
$$+ 10X_{177} + 5X_{178} + 6X_{179} \tag{145}$$
$$+ 5X_{180} + 6X_{181} + 6X_{182} \tag{146}$$
$$+ 10X_{183} + 8X_{184} + 8X_{185} \tag{147}$$
$$+ 4X_{186} + 3X_{187} + 3X_{188} \tag{148}$$
$$+ 10X_{189} + 9X_{190} + 7X_{191} \tag{149}$$
$$+ 4X_{192} + 7X_{193} + 4X_{194} \tag{150}$$
$$+ 4X_{195} + 10X_{196} + 8X_{197} \tag{151}$$
$$+ 10X_{198} + 1X_{199} + 5X_{200} \tag{152}$$
$$+ 2X_{201} + 6X_{202} + 3X_{203} \tag{153}$$
$$+ 7X_{204} + 5X_{205} + 8X_{206} \tag{154}$$
$$+ 3X_{207} + 3X_{208} + 8X_{209} \tag{155}$$
$$+ 10X_{210} + 10X_{211} + 1X_{212} \tag{156}$$
$$+ 4X_{213} + 7X_{214} + 8X_{215} \tag{157}$$
$$+ 1X_{216} + 10X_{217} + 3X_{218} \tag{158}$$
$$+ 10X_{219} + 10X_{220} + 10X_{221} \tag{159}$$
$$+ 6X_{222} + 6X_{223} + 5X_{224} \tag{160}$$
$$+ 1X_{225} + 8X_{226} + 8X_{227} \tag{161}$$
$$+ 9X_{228} + 9X_{229} + 7X_{230} \tag{162}$$
$$+ 5X_{231} + 7X_{232} + 4X_{233} \tag{163}$$
$$+ 8X_{234} + 3X_{235} + 5X_{236} \tag{164}$$
$$+ 1X_{237} + 4X_{238} + 5X_{239} \tag{165}$$
$$+ 3X_{240} + 9X_{241} + 9X_{242} \tag{166}$$
$$+ 2X_{243} + 5X_{244} + 9X_{245} \tag{167}$$
$$+ 4X_{246} + 2X_{247} + 8X_{248} \tag{168}$$
$$+ 3X_{249} + 2X_{250} + 9X_{251}$$

# 3 约束条件

## 3.1 等式约束 (33 个)

$$X_{16} + X_{17} + X_{18} + X_{19} + X_{20} = +24 \quad \text{(C\_1)} \tag{169}$$
$$X_{35} + X_{36} + X_{37} + X_{38} + X_{39} + X_{40} \tag{170}$$
$$+ X_{41} = +19 \quad \text{(C\_2)} \tag{171}$$
$$X_{56} + X_{57} + X_{58} + X_{59} + X_{60} + X_{61} \tag{172}$$
$$+ X_{62} = +31 \quad \text{(C\_3)} \tag{173}$$
$$X_{77} + X_{78} + X_{79} + X_{80} + X_{81} + X_{82} \tag{174}$$
$$+ X_{83} = +30 \quad \text{(C\_4)} \tag{175}$$
$$X_{98} + X_{99} + X_{100} + X_{101} + X_{102} + X_{103} \tag{176}$$

$$+ X_{104} = +26 \quad \text{(C\_5)} \quad (177)$$

$$X_{118} + X_{119} + X_{120} + X_{121} + X_{122} + X_{123} \quad (178)$$

$$+ X_{124} + X_{125} = +14 \quad \text{(C\_6)} \quad (179)$$

$$X_{139} + X_{140} + X_{141} + X_{142} + X_{143} + X_{144} \quad (180)$$

$$+ X_{145} + X_{146} = +23 \quad \text{(C\_7)} \quad (181)$$

$$X_{160} + X_{161} + X_{162} + X_{163} + X_{164} + X_{165} \quad (182)$$

$$+ X_{166} + X_{167} = +20 \quad \text{(C\_8)} \quad (183)$$

$$X_{181} + X_{182} + X_{183} + X_{184} + X_{185} + X_{186} \quad (184)$$

$$+ X_{187} + X_{188} = +63 \quad \text{(C\_9)} \quad (185)$$

$$X_{202} + X_{203} + X_{204} + X_{205} + X_{206} + X_{207} \quad (186)$$

$$+ X_{208} + X_{209} = +13 \quad \text{(C\_10)} \quad (187)$$

$$X_{222} + X_{223} + X_{224} + X_{225} + X_{226} + X_{227} \quad (188)$$

$$+ X_{228} + X_{229} + X_{230} = +32 \quad \text{(C\_11)} \quad (189)$$

$$X_{243} + X_{244} + X_{245} + X_{246} + X_{247} + X_{248} \quad (190)$$

$$+ X_{249} + X_{250} + X_{251} = +25 \quad \text{(C\_12)} \quad (191)$$

$$X_0 + X_{21} + X_{42} + X_{63} + X_{84} + X_{105} \quad (192)$$

$$+ X_{126} + X_{147} + X_{168} + X_{189} + X_{210} + X_{231} = +2 \quad \text{(B0)} \quad (193)$$

$$X_1 + X_{22} + X_{43} + X_{64} + X_{85} + X_{106} \quad (194)$$

$$+ X_{127} + X_{148} + X_{169} + X_{190} + X_{211} + X_{232} = +8 \quad \text{(B1)} \quad (195)$$

$$X_2 + X_{23} + X_{44} + X_{65} + X_{86} + X_{107} \quad (196)$$

$$+ X_{128} + X_{149} + X_{170} + X_{191} + X_{212} + X_{233} = +2 \quad \text{(B2)} \quad (197)$$

$$X_3 + X_{24} + X_{45} + X_{66} + X_{87} + X_{108} \quad (198)$$

$$+ X_{129} + X_{150} + X_{171} + X_{192} + X_{213} + X_{234} = +3 \quad \text{(B3)} \quad (199)$$

$$X_4 + X_{25} + X_{46} + X_{67} + X_{88} + X_{109} \quad (200)$$

$$+ X_{130} + X_{151} + X_{172} + X_{193} + X_{214} + X_{235} = +19 \quad \text{(B4)} \quad (201)$$

$$X_5 + X_{26} + X_{47} + X_{68} + X_{89} + X_{110} \quad (202)$$

$$+ X_{131} + X_{152} + X_{173} + X_{194} + X_{215} + X_{236} = +5 \quad \text{(B5)} \quad (203)$$

$$X_6 + X_{27} + X_{48} + X_{69} + X_{90} + X_{111} \quad (204)$$

$$+ X_{132} + X_{153} + X_{174} + X_{195} + X_{216} + X_{237} = +15 \quad \text{(B6)} \quad (205)$$

$$X_7 + X_{28} + X_{49} + X_{70} + X_{91} + X_{112} \quad (206)$$

$$+ X_{133} + X_{154} + X_{175} + X_{196} + X_{217} + X_{238} = +38 \quad \text{(B7)} \quad (207)$$

$$X_8 + X_{29} + X_{50} + X_{71} + X_{92} + X_{113} \quad (208)$$

$$+ X_{134} + X_{155} + X_{176} + X_{197} + X_{218} + X_{239} = +32 \quad \text{(B8)} \quad (209)$$

$$X_9 + X_{30} + X_{51} + X_{72} + X_{93} + X_{114} \quad (210)$$

$$+ X_{135} + X_{156} + X_{177} + X_{198} + X_{219} + X_{240} = +9 \quad \text{(B9)} \quad (211)$$

$$X_{10} + X_{31} + X_{52} + X_{73} + X_{94} + X_{115} \quad (212)$$

$$+ X_{136} + X_{157} + X_{178} + X_{199} + X_{220} + X_{241} = +3 \quad \text{(B10)} \quad (213)$$

$$X_{11} + X_{32} + X_{53} + X_{74} + X_{95} + X_{116} \quad (214)$$

$$+ X_{137} + X_{158} + X_{179} + X_{200} + X_{221} + X_{242} = +21 \quad \text{(B11)} \quad (215)$$

$$X_{12} + X_{33} + X_{54} + X_{75} + X_{96} + X_{117} \quad (216)$$

$$+ X_{138} + X_{159} + X_{180} + X_{201} + X_{222} + X_{243} = +2 \quad \text{(B12)} \quad (217)$$

$$X_{13} + X_{34} + X_{55} + X_{76} + X_{97} + X_{118} \quad (218)$$

$$+ X_{139} + X_{160} + X_{181} + X_{202} + X_{223} + X_{244} = +29 \quad \text{(B13)} \quad (219)$$

$$X_{14} + X_{35} + X_{56} + X_{77} + X_{98} + X_{119} \quad (220)$$

$$+ X_{140} + X_{161} + X_{182} + X_{203} + X_{224} + X_{245} = +5 \quad \text{(B14)} \quad (221)$$

$$X_{15} + X_{36} + X_{57} + X_{78} + X_{99} + X_{120} \quad (222)$$

$$+ X_{141} + X_{162} + X_{183} + X_{204} + X_{225} + X_{246} = +50 \quad \text{(B15)} \quad (223)$$

$$X_{16} + X_{37} + X_{58} + X_{79} + X_{100} + X_{121} \quad (224)$$

$$+ X_{142} + X_{163} + X_{184} + X_{205} + X_{226} + X_{247} = +9 \quad \text{(B16)} \quad (225)$$

$$X_{17} + X_{38} + X_{59} + X_{80} + X_{101} + X_{122} \quad (226)$$

$$+ X_{143} + X_{164} + X_{185} + X_{206} + X_{227} + X_{248} = +7 \quad \text{(B17)} \quad (227)$$

$$X_{18} + X_{39} + X_{60} + X_{81} + X_{102} + X_{123} \quad (228)$$

$$+ X_{144} + X_{165} + X_{186} + X_{207} + X_{228} + X_{249} = +27 \quad \text{(B18)} \quad (229)$$

$$X_{19} + X_{40} + X_{61} + X_{82} + X_{103} + X_{124} \quad (230)$$

$$+ X_{145} + X_{166} + X_{187} + X_{208} + X_{229} + X_{250} = +7 \quad \text{(B19)} \quad (231)$$

$$X_{20} + X_{41} + X_{62} + X_{83} + X_{104} + X_{125} \quad (232)$$

$$+ X_{146} + X_{167} + X_{188} + X_{209} + X_{230} + X_{251} = +27 \quad \text{(B20)} \quad (233)$$

(234)

## 3.2 不等式约束 (264 个)

$$X_0 - 2Y_0 \leq +0 \quad \text{(G0)} \quad (235)$$

$$X_1 - 8Y_1 \leq +0 \quad \text{(G1)} \quad (236)$$

$$X_2 - 2Y_2 \leq +0 \quad \text{(G2)} \quad (237)$$

$$X_3 - 3Y_3 \leq +0 \quad \text{(G3)} \quad (238)$$

$$X_4 - 19Y_4 \leq +0 \quad \text{(G4)} \quad (239)$$

$$X_5 - 5Y_5 \leq +0 \quad \text{(G5)} \quad (240)$$

$$X_6 - 15Y_6 \leq +0 \quad \text{(G6)} \quad (241)$$

$$X_7 - 24Y_7 \leq +0 \quad \text{(G7)} \quad (242)$$

$$X_8 - 24Y_8 \leq +0 \quad \text{(G8)} \quad (243)$$

$$X_9 - 9Y_9 \leq +0 \quad \text{(G9)} \quad (244)$$

$$X_{10} - 3Y_{10} \leq +0 \quad \text{(G10)} \quad (245)$$

$$X_{11} - 21Y_{11} \leq +0 \quad \text{(G11)} \quad (246)$$

$$X_{12} - 2Y_{12} \leq +0 \quad \text{(G12)} \quad (247)$$

$$X_{13} - 24Y_{13} \leq +0 \quad \text{(G13)} \quad (248)$$

$$X_{14} - 5Y_{14} \leq +0 \quad \text{(G14)} \quad (249)$$

$$X_{15} - 24Y_{15} \leq +0 \quad \text{(G15)} \quad (250)$$

$$X_{16} - 9Y_{16} \leq +0 \quad \text{(G16)} \quad (251)$$

$$X_{17} - 7Y_{17} \leq +0 \quad \text{(G17)} \quad (252)$$

$$X_{18} - 24Y_{18} \leq +0 \quad \text{(G18)} \quad (253)$$

$$X_{19} - 7Y_{19} \leq +0 \quad \text{(G19)} \quad (254)$$

$$X_{20} - 24Y_{20} \leq +0 \quad \text{(G20)} \quad (255)$$

$$X_{21} - 2Y_{21} \leq +0 \quad \text{(G21)} \quad (256)$$

$$X_{22} - 8Y_{22} \leq +0 \quad \text{(G22)} \quad (257)$$

$$X_{23} - 2Y_{23} \leq +0 \quad \text{(G23)} \quad (258)$$

$$X_{24} - 3Y_{24} \leq +0 \quad \text{(G24)} \quad (259)$$

$$X_{25} - 19Y_{25} \leq +0 \quad \text{(G25)} \quad (260)$$

$$X_{26} - 5Y_{26} \leq +0 \quad \text{(G26)} \quad (261)$$

$$X_{27} - 15Y_{27} \leq +0 \quad \text{(G27)} \quad (262)$$

$$X_{28} - 19Y_{28} \leq +0 \quad \text{(G28)} \quad (263)$$

$$X_{29} - 19Y_{29} \leq +0 \quad \text{(G29)} \quad (264)$$

$$X_{30} - 9Y_{30} \leq +0 \quad \text{(G30)} \quad (265)$$

$$X_{31} - 3Y_{31} \leq +0 \quad \text{(G31)} \quad (266)$$

$$X_{32} - 19Y_{32} \leq +0 \quad \text{(G32)} \quad (267)$$

$$X_{33} - 2Y_{33} \leq +0 \quad \text{(G33)} \quad (268)$$

$$X_{34} - 19Y_{34} \leq +0 \quad \text{(G34)} \quad (269)$$

$$X_{35} - 5Y_{35} \leq +0 \quad \text{(G35)} \quad (270)$$

$$X_{36} - 19Y_{36} \leq +0 \quad \text{(G36)} \quad (271)$$

$$X_{37} - 9Y_{37} \leq +0 \quad \text{(G37)} \quad (272)$$

$$X_{38} - 7Y_{38} \leq +0 \quad \text{(G38)} \quad (273)$$

$$X_{39} - 19Y_{39} \leq +0 \quad \text{(G39)} \quad (274)$$

$$X_{40} - 7Y_{40} \leq +0 \quad \text{(G40)} \quad (275)$$

$$X_{41} - 19Y_{41} \leq +0 \quad \text{(G41)} \quad (276)$$

$$X_{42} - 2Y_{42} \leq +0 \quad \text{(G42)} \quad (277)$$

$$X_{43} - 8Y_{43} \leq +0 \quad \text{(G43)} \quad (278)$$

$$X_{44} - 2Y_{44} \leq +0 \quad \text{(G44)} \quad (279)$$

$$X_{45} - 3Y_{45} \leq +0 \quad \text{(G45)} \quad (280)$$

$$X_{46} - 19Y_{46} \leq +0 \quad \text{(G46)} \quad (281)$$

$$X_{47} - 5Y_{47} \leq +0 \quad \text{(G47)} \quad (282)$$

$$X_{48} - 15Y_{48} \leq +0 \quad \text{(G48)} \quad (283)$$

$$X_{49} - 31Y_{49} \leq +0 \quad \text{(G49)} \quad (284)$$

$$X_{50} - 31Y_{50} \leq +0 \quad \text{(G50)} \quad (285)$$

$$X_{51} - 9Y_{51} \leq +0 \quad \text{(G51)} \quad (286)$$

$$X_{52} - 3Y_{52} \leq +0 \quad \text{(G52)} \quad (287)$$

$$X_{53} - 21Y_{53} \leq +0 \quad \text{(G53)} \quad (288)$$

$$X_{54} - 2Y_{54} \leq +0 \quad \text{(G54)} \quad (289)$$

$$X_{55} - 29Y_{55} \leq +0 \quad \text{(G55)} \quad (290)$$

$$X_{56} - 5Y_{56} \leq +0 \quad \text{(G56)} \quad (291)$$

$$X_{57} - 31Y_{57} \leq +0 \quad \text{(G57)} \quad (292)$$

$$X_{58} - 9Y_{58} \leq +0 \quad \text{(G58)} \quad (293)$$

$$X_{59} - 7Y_{59} \leq +0 \quad \text{(G59)} \quad (294)$$

$$X_{60} - 27Y_{60} \leq +0 \quad \text{(G60)} \quad (295)$$

$$X_{61} - 7Y_{61} \leq +0 \quad \text{(G61)} \quad (296)$$

$$X_{62} - 27Y_{62} \leq +0 \quad \text{(G62)} \quad (297)$$

$$X_{63} - 2Y_{63} \leq +0 \quad \text{(G63)} \quad (298)$$

$$X_{64} - 8Y_{64} \leq +0 \quad \text{(G64)} \quad (299)$$

$$X_{65} - 2Y_{65} \leq +0 \quad \text{(G65)} \quad (300)$$
$$X_{66} - 3Y_{66} \leq +0 \quad \text{(G66)} \quad (301)$$
$$X_{67} - 19Y_{67} \leq +0 \quad \text{(G67)} \quad (302)$$
$$X_{68} - 5Y_{68} \leq +0 \quad \text{(G68)} \quad (303)$$
$$X_{69} - 15Y_{69} \leq +0 \quad \text{(G69)} \quad (304)$$
$$X_{70} - 30Y_{70} \leq +0 \quad \text{(G70)} \quad (305)$$
$$X_{71} - 30Y_{71} \leq +0 \quad \text{(G71)} \quad (306)$$
$$X_{72} - 9Y_{72} \leq +0 \quad \text{(G72)} \quad (307)$$
$$X_{73} - 3Y_{73} \leq +0 \quad \text{(G73)} \quad (308)$$
$$X_{74} - 21Y_{74} \leq +0 \quad \text{(G74)} \quad (309)$$
$$X_{75} - 2Y_{75} \leq +0 \quad \text{(G75)} \quad (310)$$
$$X_{76} - 29Y_{76} \leq +0 \quad \text{(G76)} \quad (311)$$
$$X_{77} - 5Y_{77} \leq +0 \quad \text{(G77)} \quad (312)$$
$$X_{78} - 30Y_{78} \leq +0 \quad \text{(G78)} \quad (313)$$
$$X_{79} - 9Y_{79} \leq +0 \quad \text{(G79)} \quad (314)$$
$$X_{80} - 7Y_{80} \leq +0 \quad \text{(G80)} \quad (315)$$
$$X_{81} - 27Y_{81} \leq +0 \quad \text{(G81)} \quad (316)$$
$$X_{82} - 7Y_{82} \leq +0 \quad \text{(G82)} \quad (317)$$
$$X_{83} - 27Y_{83} \leq +0 \quad \text{(G83)} \quad (318)$$
$$X_{84} - 2Y_{84} \leq +0 \quad \text{(G84)} \quad (319)$$
$$X_{85} - 8Y_{85} \leq +0 \quad \text{(G85)} \quad (320)$$
$$X_{86} - 2Y_{86} \leq +0 \quad \text{(G86)} \quad (321)$$
$$X_{87} - 3Y_{87} \leq +0 \quad \text{(G87)} \quad (322)$$
$$X_{88} - 19Y_{88} \leq +0 \quad \text{(G88)} \quad (323)$$
$$X_{89} - 5Y_{89} \leq +0 \quad \text{(G89)} \quad (324)$$
$$X_{90} - 15Y_{90} \leq +0 \quad \text{(G90)} \quad (325)$$
$$X_{91} - 26Y_{91} \leq +0 \quad \text{(G91)} \quad (326)$$
$$X_{92} - 26Y_{92} \leq +0 \quad \text{(G92)} \quad (327)$$
$$X_{93} - 9Y_{93} \leq +0 \quad \text{(G93)} \quad (328)$$
$$X_{94} - 3Y_{94} \leq +0 \quad \text{(G94)} \quad (329)$$
$$X_{95} - 21Y_{95} \leq +0 \quad \text{(G95)} \quad (330)$$
$$X_{96} - 2Y_{96} \leq +0 \quad \text{(G96)} \quad (331)$$
$$X_{97} - 26Y_{97} \leq +0 \quad \text{(G97)} \quad (332)$$
$$X_{98} - 5Y_{98} \leq +0 \quad \text{(G98)} \quad (333)$$
$$X_{99} - 26Y_{99} \leq +0 \quad \text{(G99)} \quad (334)$$
$$X_{100} - 9Y_{100} \leq +0 \quad \text{(G100)} \quad (335)$$
$$X_{101} - 7Y_{101} \leq +0 \quad \text{(G101)} \quad (336)$$
$$X_{102} - 26Y_{102} \leq +0 \quad \text{(G102)} \quad (337)$$
$$X_{103} - 7Y_{103} \leq +0 \quad \text{(G103)} \quad (338)$$
$$X_{104} - 26Y_{104} \leq +0 \quad \text{(G104)} \quad (339)$$
$$X_{105} - 2Y_{105} \leq +0 \quad \text{(G105)} \quad (340)$$
$$X_{106} - 8Y_{106} \leq +0 \quad \text{(G106)} \quad (341)$$

$$X_{107} - 2Y_{107} \leq +0 \quad \text{(G107)} \quad (342)$$
$$X_{108} - 3Y_{108} \leq +0 \quad \text{(G108)} \quad (343)$$
$$X_{109} - 14Y_{109} \leq +0 \quad \text{(G109)} \quad (344)$$
$$X_{110} - 5Y_{110} \leq +0 \quad \text{(G110)} \quad (345)$$
$$X_{111} - 14Y_{111} \leq +0 \quad \text{(G111)} \quad (346)$$
$$X_{112} - 14Y_{112} \leq +0 \quad \text{(G112)} \quad (347)$$
$$X_{113} - 14Y_{113} \leq +0 \quad \text{(G113)} \quad (348)$$
$$X_{114} - 9Y_{114} \leq +0 \quad \text{(G114)} \quad (349)$$
$$X_{115} - 3Y_{115} \leq +0 \quad \text{(G115)} \quad (350)$$
$$X_{116} - 14Y_{116} \leq +0 \quad \text{(G116)} \quad (351)$$
$$X_{117} - 2Y_{117} \leq +0 \quad \text{(G117)} \quad (352)$$
$$X_{118} - 14Y_{118} \leq +0 \quad \text{(G118)} \quad (353)$$
$$X_{119} - 5Y_{119} \leq +0 \quad \text{(G119)} \quad (354)$$
$$X_{120} - 14Y_{120} \leq +0 \quad \text{(G120)} \quad (355)$$
$$X_{121} - 9Y_{121} \leq +0 \quad \text{(G121)} \quad (356)$$
$$X_{122} - 7Y_{122} \leq +0 \quad \text{(G122)} \quad (357)$$
$$X_{123} - 14Y_{123} \leq +0 \quad \text{(G123)} \quad (358)$$
$$X_{124} - 7Y_{124} \leq +0 \quad \text{(G124)} \quad (359)$$
$$X_{125} - 14Y_{125} \leq +0 \quad \text{(G125)} \quad (360)$$
$$X_{126} - 2Y_{126} \leq +0 \quad \text{(G126)} \quad (361)$$
$$X_{127} - 8Y_{127} \leq +0 \quad \text{(G127)} \quad (362)$$
$$X_{128} - 2Y_{128} \leq +0 \quad \text{(G128)} \quad (363)$$
$$X_{129} - 3Y_{129} \leq +0 \quad \text{(G129)} \quad (364)$$
$$X_{130} - 19Y_{130} \leq +0 \quad \text{(G130)} \quad (365)$$
$$X_{131} - 5Y_{131} \leq +0 \quad \text{(G131)} \quad (366)$$
$$X_{132} - 15Y_{132} \leq +0 \quad \text{(G132)} \quad (367)$$
$$X_{133} - 23Y_{133} \leq +0 \quad \text{(G133)} \quad (368)$$
$$X_{134} - 23Y_{134} \leq +0 \quad \text{(G134)} \quad (369)$$
$$X_{135} - 9Y_{135} \leq +0 \quad \text{(G135)} \quad (370)$$
$$X_{136} - 3Y_{136} \leq +0 \quad \text{(G136)} \quad (371)$$
$$X_{137} - 21Y_{137} \leq +0 \quad \text{(G137)} \quad (372)$$
$$X_{138} - 2Y_{138} \leq +0 \quad \text{(G138)} \quad (373)$$
$$X_{139} - 23Y_{139} \leq +0 \quad \text{(G139)} \quad (374)$$
$$X_{140} - 5Y_{140} \leq +0 \quad \text{(G140)} \quad (375)$$
$$X_{141} - 23Y_{141} \leq +0 \quad \text{(G141)} \quad (376)$$
$$X_{142} - 9Y_{142} \leq +0 \quad \text{(G142)} \quad (377)$$
$$X_{143} - 7Y_{143} \leq +0 \quad \text{(G143)} \quad (378)$$
$$X_{144} - 23Y_{144} \leq +0 \quad \text{(G144)} \quad (379)$$
$$X_{145} - 7Y_{145} \leq +0 \quad \text{(G145)} \quad (380)$$
$$X_{146} - 23Y_{146} \leq +0 \quad \text{(G146)} \quad (381)$$
$$X_{147} - 2Y_{147} \leq +0 \quad \text{(G147)} \quad (382)$$
$$X_{148} - 8Y_{148} \leq +0 \quad \text{(G148)} \quad (383)$$

$$X_{149} - 2Y_{149} \leq +0 \quad \text{(G149)} \quad (384)$$
$$X_{150} - 3Y_{150} \leq +0 \quad \text{(G150)} \quad (385)$$
$$X_{151} - 19Y_{151} \leq +0 \quad \text{(G151)} \quad (386)$$
$$X_{152} - 5Y_{152} \leq +0 \quad \text{(G152)} \quad (387)$$
$$X_{153} - 15Y_{153} \leq +0 \quad \text{(G153)} \quad (388)$$
$$X_{154} - 20Y_{154} \leq +0 \quad \text{(G154)} \quad (389)$$
$$X_{155} - 20Y_{155} \leq +0 \quad \text{(G155)} \quad (390)$$
$$X_{156} - 9Y_{156} \leq +0 \quad \text{(G156)} \quad (391)$$
$$X_{157} - 3Y_{157} \leq +0 \quad \text{(G157)} \quad (392)$$
$$X_{158} - 20Y_{158} \leq +0 \quad \text{(G158)} \quad (393)$$
$$X_{159} - 2Y_{159} \leq +0 \quad \text{(G159)} \quad (394)$$
$$X_{160} - 20Y_{160} \leq +0 \quad \text{(G160)} \quad (395)$$
$$X_{161} - 5Y_{161} \leq +0 \quad \text{(G161)} \quad (396)$$
$$X_{162} - 20Y_{162} \leq +0 \quad \text{(G162)} \quad (397)$$
$$X_{163} - 9Y_{163} \leq +0 \quad \text{(G163)} \quad (398)$$
$$X_{164} - 7Y_{164} \leq +0 \quad \text{(G164)} \quad (399)$$
$$X_{165} - 20Y_{165} \leq +0 \quad \text{(G165)} \quad (400)$$
$$X_{166} - 7Y_{166} \leq +0 \quad \text{(G166)} \quad (401)$$
$$X_{167} - 20Y_{167} \leq +0 \quad \text{(G167)} \quad (402)$$
$$X_{168} - 2Y_{168} \leq +0 \quad \text{(G168)} \quad (403)$$
$$X_{169} - 8Y_{169} \leq +0 \quad \text{(G169)} \quad (404)$$
$$X_{170} - 2Y_{170} \leq +0 \quad \text{(G170)} \quad (405)$$
$$X_{171} - 3Y_{171} \leq +0 \quad \text{(G171)} \quad (406)$$
$$X_{172} - 19Y_{172} \leq +0 \quad \text{(G172)} \quad (407)$$
$$X_{173} - 5Y_{173} \leq +0 \quad \text{(G173)} \quad (408)$$
$$X_{174} - 15Y_{174} \leq +0 \quad \text{(G174)} \quad (409)$$
$$X_{175} - 38Y_{175} \leq +0 \quad \text{(G175)} \quad (410)$$
$$X_{176} - 32Y_{176} \leq +0 \quad \text{(G176)} \quad (411)$$
$$X_{177} - 9Y_{177} \leq +0 \quad \text{(G177)} \quad (412)$$
$$X_{178} - 3Y_{178} \leq +0 \quad \text{(G178)} \quad (413)$$
$$X_{179} - 21Y_{179} \leq +0 \quad \text{(G179)} \quad (414)$$
$$X_{180} - 2Y_{180} \leq +0 \quad \text{(G180)} \quad (415)$$
$$X_{181} - 29Y_{181} \leq +0 \quad \text{(G181)} \quad (416)$$
$$X_{182} - 5Y_{182} \leq +0 \quad \text{(G182)} \quad (417)$$
$$X_{183} - 50Y_{183} \leq +0 \quad \text{(G183)} \quad (418)$$
$$X_{184} - 9Y_{184} \leq +0 \quad \text{(G184)} \quad (419)$$
$$X_{185} - 7Y_{185} \leq +0 \quad \text{(G185)} \quad (420)$$
$$X_{186} - 27Y_{186} \leq +0 \quad \text{(G186)} \quad (421)$$
$$X_{187} - 7Y_{187} \leq +0 \quad \text{(G187)} \quad (422)$$
$$X_{188} - 27Y_{188} \leq +0 \quad \text{(G188)} \quad (423)$$
$$X_{189} - 2Y_{189} \leq +0 \quad \text{(G189)} \quad (424)$$
$$X_{190} - 8Y_{190} \leq +0 \quad \text{(G190)} \quad (425)$$

$$X_{191} - 2Y_{191} \leq +0 \quad \text{(G191)} \quad (426)$$

$$X_{192} - 3Y_{192} \leq +0 \quad \text{(G192)} \quad (427)$$

$$X_{193} - 13Y_{193} \leq +0 \quad \text{(G193)} \quad (428)$$

$$X_{194} - 5Y_{194} \leq +0 \quad \text{(G194)} \quad (429)$$

$$X_{195} - 13Y_{195} \leq +0 \quad \text{(G195)} \quad (430)$$

$$X_{196} - 13Y_{196} \leq +0 \quad \text{(G196)} \quad (431)$$

$$X_{197} - 13Y_{197} \leq +0 \quad \text{(G197)} \quad (432)$$

$$X_{198} - 9Y_{198} \leq +0 \quad \text{(G198)} \quad (433)$$

$$X_{199} - 3Y_{199} \leq +0 \quad \text{(G199)} \quad (434)$$

$$X_{200} - 13Y_{200} \leq +0 \quad \text{(G200)} \quad (435)$$

$$X_{201} - 2Y_{201} \leq +0 \quad \text{(G201)} \quad (436)$$

$$X_{202} - 13Y_{202} \leq +0 \quad \text{(G202)} \quad (437)$$

$$X_{203} - 5Y_{203} \leq +0 \quad \text{(G203)} \quad (438)$$

$$X_{204} - 13Y_{204} \leq +0 \quad \text{(G204)} \quad (439)$$

$$X_{205} - 9Y_{205} \leq +0 \quad \text{(G205)} \quad (440)$$

$$X_{206} - 7Y_{206} \leq +0 \quad \text{(G206)} \quad (441)$$

$$X_{207} - 13Y_{207} \leq +0 \quad \text{(G207)} \quad (442)$$

$$X_{208} - 7Y_{208} \leq +0 \quad \text{(G208)} \quad (443)$$

$$X_{209} - 13Y_{209} \leq +0 \quad \text{(G209)} \quad (444)$$

$$X_{210} - 2Y_{210} \leq +0 \quad \text{(G210)} \quad (445)$$

$$X_{211} - 8Y_{211} \leq +0 \quad \text{(G211)} \quad (446)$$

$$X_{212} - 2Y_{212} \leq +0 \quad \text{(G212)} \quad (447)$$

$$X_{213} - 3Y_{213} \leq +0 \quad \text{(G213)} \quad (448)$$

$$X_{214} - 19Y_{214} \leq +0 \quad \text{(G214)} \quad (449)$$

$$X_{215} - 5Y_{215} \leq +0 \quad \text{(G215)} \quad (450)$$

$$X_{216} - 15Y_{216} \leq +0 \quad \text{(G216)} \quad (451)$$

$$X_{217} - 32Y_{217} \leq +0 \quad \text{(G217)} \quad (452)$$

$$X_{218} - 32Y_{218} \leq +0 \quad \text{(G218)} \quad (453)$$

$$X_{219} - 9Y_{219} \leq +0 \quad \text{(G219)} \quad (454)$$

$$X_{220} - 3Y_{220} \leq +0 \quad \text{(G220)} \quad (455)$$

$$X_{221} - 21Y_{221} \leq +0 \quad \text{(G221)} \quad (456)$$

$$X_{222} - 2Y_{222} \leq +0 \quad \text{(G222)} \quad (457)$$

$$X_{223} - 29Y_{223} \leq +0 \quad \text{(G223)} \quad (458)$$

$$X_{224} - 5Y_{224} \leq +0 \quad \text{(G224)} \quad (459)$$

$$X_{225} - 32Y_{225} \leq +0 \quad \text{(G225)} \quad (460)$$

$$X_{226} - 9Y_{226} \leq +0 \quad \text{(G226)} \quad (461)$$

$$X_{227} - 7Y_{227} \leq +0 \quad \text{(G227)} \quad (462)$$

$$X_{228} - 27Y_{228} \leq +0 \quad \text{(G228)} \quad (463)$$

$$X_{229} - 7Y_{229} \leq +0 \quad \text{(G229)} \quad (464)$$

$$X_{230} - 27Y_{230} \leq +0 \quad \text{(G230)} \quad (465)$$

$$X_{231} - 2Y_{231} \leq +0 \quad \text{(G231)} \quad (466)$$

$$X_{232} - 8Y_{232} \leq +0 \quad \text{(G232)} \quad (467)$$

$$X_{233} - 2Y_{233} \leq +0 \quad \text{(G233)} \tag{468}$$
$$X_{234} - 3Y_{234} \leq +0 \quad \text{(G234)} \tag{469}$$
$$X_{235} - 19Y_{235} \leq +0 \quad \text{(G235)} \tag{470}$$
$$X_{236} - 5Y_{236} \leq +0 \quad \text{(G236)} \tag{471}$$
$$X_{237} - 15Y_{237} \leq +0 \quad \text{(G237)} \tag{472}$$
$$X_{238} - 25Y_{238} \leq +0 \quad \text{(G238)} \tag{473}$$
$$X_{239} - 25Y_{239} \leq +0 \quad \text{(G239)} \tag{474}$$
$$X_{240} - 9Y_{240} \leq +0 \quad \text{(G240)} \tag{475}$$
$$X_{241} - 3Y_{241} \leq +0 \quad \text{(G241)} \tag{476}$$
$$X_{242} - 21Y_{242} \leq +0 \quad \text{(G242)} \tag{477}$$
$$X_{243} - 2Y_{243} \leq +0 \quad \text{(G243)} \tag{478}$$
$$X_{244} - 25Y_{244} \leq +0 \quad \text{(G244)} \tag{479}$$
$$X_{245} - 5Y_{245} \leq +0 \quad \text{(G245)} \tag{480}$$
$$X_{246} - 25Y_{246} \leq +0 \quad \text{(G246)} \tag{481}$$
$$X_{247} - 9Y_{247} \leq +0 \quad \text{(G247)} \tag{482}$$
$$X_{248} - 7Y_{248} \leq +0 \quad \text{(G248)} \tag{483}$$
$$X_{249} - 25Y_{249} \leq +0 \quad \text{(G249)} \tag{484}$$
$$X_{250} - 7Y_{250} \leq +0 \quad \text{(G250)} \tag{485}$$
$$X_{251} - 25Y_{251} \leq +0 \quad \text{(G251)} \tag{486}$$
(487)

# 4 变量定义

## 4.1 二元变量 (252 个)

$$Y_i \in \{0, 1\}, \quad i \in \{0, 1, 2, \ldots, 251\} \tag{488}$$

**二元变量示例** (显示前 50 个，共 252 个):

$Y_{250}$, $Y_0$, $Y_1$, $Y_2$, $Y_3$, $Y_4$, $Y_5$, $Y_6$, $Y_7$, $Y_8$,
$Y_9$, $Y_{10}$, $Y_{11}$, $Y_{12}$, $Y_{13}$, $Y_{14}$, $Y_{15}$, $Y_{16}$, $Y_{17}$, $Y_{18}$,
$Y_{19}$, $Y_{20}$, $Y_{21}$, $Y_{22}$, $Y_{23}$, $Y_{24}$, $Y_{25}$, $Y_{26}$, $Y_{27}$, $Y_{28}$,
$Y_{29}$, $Y_{30}$, $Y_{31}$, $Y_{32}$, $Y_{33}$, $Y_{34}$, $Y_{35}$, $Y_{36}$, $Y_{37}$, $Y_{38}$,
$Y_{39}$, $Y_{40}$, $Y_{41}$, $Y_{42}$, $Y_{43}$, $Y_{44}$, $Y_{45}$, $Y_{46}$, $Y_{47}$, $Y_{48}$

*... 还有 202 个二元变量*

## 4.2 连续变量 (252 个)

所有连续变量均为非负实数:

$$X_j \geq 0, \quad j \in \{0, 1, 2, \ldots, 251\} \tag{489}$$

**连续变量说明:** 模型包含 252 个连续决策变量，所有变量的取值范围均为非负实数域。