```
´o
ı
ineq =
' =':'=',' <=': r' ≤',' >=': r' ≥'
init(self):self.A=[]self.b=[]self.c=[]self.t=[]self.tableau=[]self.entering=[]self.departing=[]self.ineq=[]self.prob="min"self.gendoc=Falseself.doc=""self.f=0s
simplex(self, A, b, c, f, s, t, prob ='
min', ineq =
[], enablemsg =
False, latex =
False) :'''
Runsimplexalgorithm.'''self.prob =
probself.gendoc =
latexCriarounaoodocself.ineq =
ineqself.s =
sself.f =
fself.t =
tAddslackartificialvariablesself.setsimplexinput(A, b, c)
terminate()) :
Attempttofindanon−
negativepivot.pivot =
self.findpivot()Dorowoperationstomakeeveryotherelementincolumnzero.self.pivot(pivot)solution =
self.getcurrentsolution()Obtemasolucaoself.docgenerate(solution)returnsolution
simplexinput(self, A, b, c) :'''
Setinitialvariablesandcreatetableau.'''Convertallentriestofractionsforreadability.forainA :
self.A.append([Fraction(x)forxina])self.b =
[Fraction(x)forxinb]self.c =
[Fraction(x)forxinc]ifnotself.ineq :
ifself.prob ==' 
max' :
self.ineq =
['<='
]*
len(b)elifself.prob ==' 
min' :
self.ineq =
['<='
]*
len(b)Alteração
enterdepart(self.getAb())
Ab()m.append(self.c+
[0])m =
[list(t)fortinzip(*m)]Calculatesthetransposeself.A =
[x[:
(len(x)−
1)]forxinm]self.b =
[y[len(y)−
1]foryinm]self.c =
m[len(m)−
1]self.A.pop()self.b.pop()self.c.pop()self.ineq =
['<='
]*
len(self.b)
table au()self.ineq =
['='
]*
len(self.b)self.updateenterdepart(self.tableau)
enterdepart(self, matrix) :
self.entering =
[]self.departing =
[]Createtablesforenteringanddepartingvariablesforiinrange(0, len(matrix[0])) :
ifi <
len(self.A[0]) :
prefix ='
x'ifself.prob ==' 
max'else'y'self.entering.append("elifi <
len(matrix[0])−
1 :
self.entering.append("s"self.departing.append("s"else :
self.entering.append("b")
slackvariables(self) :'''
Addslackartificialvariablestomatrix Atotransformallinequalitiestoequalities.'''slackvars =
self.generateidentity(len(self.tableau))foriinrange(0, len(slackvars)) :
self.tableau[i]+ =
slackvars[i]self.tableau[i]+ =
[self.b[i]]
table au(self) :'''
Createinitialtableautable.'''self.tableau =
copy.deepcopy(self.A)self.addslackvariables()c =
copy.deepcopy(self.c)forindex, valueinenumerate(c) :
c[index] =
```

$most_neg:$
$most_neg =$
$valuemost_negind =$
$indexreturnmost_negind$
$_departing_var(self, entering_index):'''$
$Tocalculatethedepartingvariable, getthe minimumoftheratiooffb(b_i)tothecorrespondingvalueintheenteringcollumn.'''sk$
$0min_ratio_index =$
$-1min_ratio =$
$0forindex, xinenumerate(self.tableau):$
$ifx[entering_index]! =$
$0andx[len(x)-$
$1]/x[entering_index] >$
$0:$
$skip =$
$indexmin_ratio_index =$
$indexmin_ratio =$
$x[len(x)-$
$1]/x[entering_index]break$
$_ratio >$
$0:$
$forindex, xinenumerate(self.tableau):$
$ifindex >$
$skipandx[entering_index] >$
$0:$
$ratio =$
$x[len(x)-$
$1]/x[entering_index]ifmin_ratio >$
$ratio:$
$min_ratio =$
$ratiomin_ratio_index =$
$index$
$_ratio_index$
$_Ab(self):'''$
$GetAmatrixwithbvectorappended.'''matrix =$
$copy.deepcopy(self.A)foriinrange(0, len(matrix)):$
$matrix[i]+ =$
$[self.b[i]]returnmatrix$
$_terminate(self):'''$
$Determineswhethertherearenynegativeelementsonthebottomrow'''result =$
$Trueindex =$
$len(self.tableau)-$
$1fori, xinenumerate(self.tableau[index]):$
$ifx <$
$0andi! =$
$len(self.tableau[index])-$
$1:$
$result =$
$Falsereturnresult$
$_current_solution(self):'''$
$Getthecurrentsolutionfromtableau.'''solution =$
$forxinself.entering:$
$ifxisnot'b':$
$ifxinself.departing:$
$solution[x] =$
$self.tableau[self.departing.index(x)][len(self.tableau[self.departing.index(x)])-$
$1]else:$
$solution[x] =$
$0solution['z'] =$
$self.tableau[len(self.tableau)-$
$1][len(self.tableau[0])-$
$1]$
$_1, ..., x_nfromlastelementoftheslackcolumns.bottom_row =$
$self.tableau[len(self.tableau)-$
$1]forvinself.entering:$
$if's'inv:$
$solution[v.replace('s','x')] =$
$bottom_row[self.entering.index(v)]$
$_fraction_to_latex(self, fract):$
$iffract.denominator ==$
$1:$
$returnstr(fract.numerator)else:$
$returnr"$
$_generate_identity(self, n):'''$
$Helperfunctionforgeneratingasquareidentitymatrix.'''I =$
$[]foriinrange(0, n):$
$row =$
$[]forjinrange(0, n):$
$ifi ==$
$j:$
$row.append(1)else:$
$row.append(0)I.append(row)returnI$
$_generate(self, solution):$
$Criatabeladeenvioegeraodocumentolatexifnotself.gen_doc:$
$returnself.doc =$
$(r"$

$'+str(i)])$
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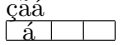
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