```
In [2]: lab = [
          [' ','
        class State:
          def __init__(self, parent, linha, coluna):
            self.parent = parent
            self.linha = linha
            self.coluna = coluna
        def showState(s):
            print('linha:', s.linha,',','coluna:', s.coluna)
        def initialState():
            return State(None,0,0)
        def goal(s):
            return (s.linha == 7 and s.coluna == 7)
        def lanceDirInf1(s):
            return State(s,s.linha+2,s.coluna+1)
        def lanceDirInf2(s):
            return State(s,s.linha+1,s.coluna+2)
        def lanceDirSup1(s):
            return State(s,s.linha-1,s.coluna+2)
        def lanceDirSup2(s):
            return State(s,s.linha-2,s.coluna+1)
        def lanceEsqInf1(s):
            return State(s,s.linha+2,s.coluna-1)
        def lanceEsqInf2(s):
            return State(s,s.linha+1,s.coluna+2)
        def lanceEsqSup1(s):
            return State(s,s.linha-1,s.coluna-2)
        def lanceEsqSup2(s):
            return State(s,s.linha-2,s.coluna-1)
        def expand(s):
            ret = []
            if(s.linha < 0 or s.coluna < 0 or s.linha > 7 or s.coluna > 7):
                return ret
            ret.append(lanceDirInf1(s))
            ret.append(lanceDirInf2(s))
            ret.append(lanceDirSup1(s))
            ret.append(lanceDirSup2(s))
            ret.append(lanceEsqInf1(s))
            ret.append(lanceEsqInf2(s))
            ret.append(lanceEsqSup1(s))
            ret.append(lanceEsqSup2(s))
            return ret
        def showPath(s):
            if(s == None):
                return
            showPath(s.parent)
            showState(s)
            lab[s.linha][s.coluna] = 'x'
```

```
queue = []
def enqueue(s):
   queue.append(s)
def dequeue():
   return queue.pop(0)
s = initialState()
enqueue(s)
while(queue):
  s = dequeue()
   if(goal(s)):
      showPath(s)
      break
   children = expand(s)
   for child in children:
      enqueue(child)
print(lab)
linha: 0 , coluna: 0
linha: 2 , coluna: 1
linha: 4 , coluna: 2
linha: 6 , coluna: 3
linha: 7 , coluna: 5
linha: 5 , coluna: 6
linha: 7 , coluna: 7
```