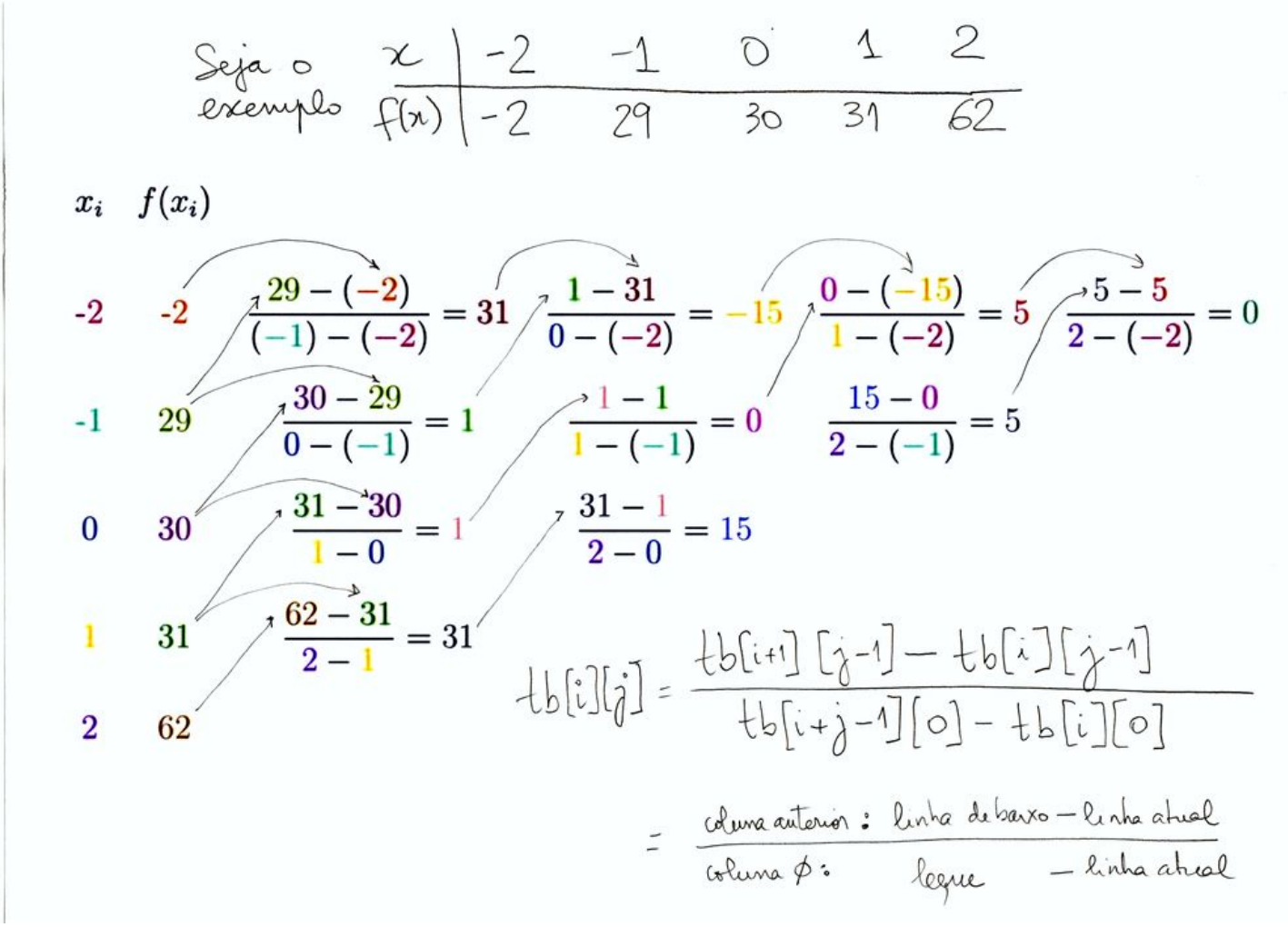
Algoritmo de Newton e Newton-Gregory

Tabela de diferenças divididas



Polinômio gerado a partir da tabela

$$P(x) = -2 + [(x-(-2))] \times 31 + [(x-(-2)) \times (x-(-1))] \times -15$$
$$+[(x-(-2)) \times (x-(-1)) \times (x-0)] \times 5$$
$$+[(x-(-2)) \times (x-(-1)) \times (x-0) \times (x-1)] \times 0$$

Algoritmo em Python para a tabela e o polinômio

```
# Polinomios de Newton (747)
import numpy as np
def polnew(a,b):
  t=len(a)
  tb=np.zeros((t,t+1),int)
  for i in range(t):
    tb[i][0]=a[i]
    tb[i][1]=b[i]
  j=2
  while j<t+1:
    for i in range(t-j+1):
      tb[i][j]=(tb[i+1][j-1]-tb[i][j-1])/(tb[i+j-1][0]-tb[i][0])
    j=j+1
  print(tb)
  print('------ o polinomio -------')
  print(str(tb[0][1]),' ',end='')
  for i in range(1,t):
```

```
    aa=tb[0][i+1]
    if aa<0:
      bb='('+str(aa)+')'
    else:
      bb=str(aa)
    print('+',bb,'[',end='')
    for j in range(i):
      aa=tb[j,0]
      if aa<0:
        bb='('+str(aa)+')'
      else:
        bb=str(aa)
      print('(x-',bb,') ',end='')
    print(']',end='')
  return tb

#polnew([-1,0,1,2,3],[1,1,0,-1,-2])
#polnew([0.9,1,1.1,1.2],[0.621,0.540,0.453,0.362])  - cosseno
polnew([-2.0,-1,0,1,2],[-2.0,29,30,31,62])

#polnew([-3,-2,-1,2,4],[333,47,-7,83,1313])
```

Programa Python para o algoritmo de Newton-Gregory

```
# newton-gregory
import numpy as np
def ngreg(a,b):
  t=len(a)
  r=np.zeros((t,t+1),float)
  for i in range(t):
    r[i][0]=a[i]
    r[i][1]=b[i]
  j=2
  while j<=t:
    i=t-j
    while i>=0:
      r[i][j]=r[i+1][j-1]-r[i][j-1]
      i=i-1
    j=j+1
  return r
print(ngreg([3,4,5,6,7,8],[2, 5, 9, 15,14,20]))
```