import numpy as np

sigma\_x=np.array([0,1],[1,0])

sigma\_y= np.array([0,-1\*j],[1\*j,0])

sigma\_z= np.array([1,0],[0,-1])

I= np.zeros([2,2])

I[0,0]=1 ; I[1,1]=1

beta=3

H=np.zeros([100,100])

sigma1\_x= np.kron(sigma\_x,I)

sigma1\_y= np.kron(sigma\_y,I)

sigma1\_z=np.kron(sigma\_z,I)

h1=0 ; h2=0 ; h3=0;

for n in [2,10,1]

sigma n\_x= np.kron(sigma n-1\_x,I)

h1=h1+np.kron(sigma n\_x ,sigma n-1\_x)

sigma n\_y=np.kron(sigma n-1\_y,I)

h2=h2+np.kron(sigma n \_y , sigman-1\_y)

sigma n\_z= np.kron(sigma n-1\_z,I)

h3=h3+np.kron(sigma n\_z , sigma n-1\_z)

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H=J\*(h1+h2+h3)+J\*(np.kron(sigma 1\_x,sigma 10\_x) +np.kron(sigma1\_y , sigma 10\_y)+np.kron(sigma1\_z, sigma10\_z))

w,v= np.linalg.eigh(h)

print(w)

s=0

s\_z=0

for i in range(101)

s=s+ np.exp(-1\*beta\*w[i,:])

s\_z = s\_z+np.dat(sigma1\_z , np.exp(-1\*beta\*w[i,:]))

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my\_op1= s\_z/s

for beta in [0,6,0.05]

print(s,beta)

plt.plot(s,beta)

plt.show