(\* This Function computes the value of S(p^n) \*)

Clear[SofP]

(\* SofP[n\_] :=((2n)!/(n!\*n!))(1/2)^(2\*n) is the factorial definition \*)

(\* What follows is the Gamma Definition -- any n works here \*)

SofP[n\_]:=(Gamma[2\*n+1]/Gamma[n+1]^2)(1/2)^(2\*n)

(\* The Function SSN computes S(n) for any positive integer n \*)

Clear[SSN]

SSN[n\_]:= 1 /; n==1

SSN[n\_]:=Product[SofP[Part[FactorInteger[Floor[n]],j,2]],{j,1, Length[FactorInteger[Floor[n]]]}] /;Abs[n-Floor[n]]<= .00001

SSN[n\_]:=SofP[n]/;Abs[n-Floor[n]]> .00001

(\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Begin your work below here \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*)

v1=5+3\*I;

s1 = Sum[N[SSN[n]/n^(v1),12],{n,1,1000000}]

s2 =N[ Sqrt[Zeta[v1]],12]

0.99024911347-0.0128310649487 I

0.990249113473-0.012831064949 I