In[2]:= GeneratingFunction[1/3\*(2^n + (-1)^(n+1)), n, x]

Out[2]:=  $\frac{1}{3} \left( \frac{1}{1-2 \times 1} - \frac{1}{1+x} \right)$ 

Out[2]= 
$$\frac{1}{3} \left( \frac{1}{1-2 \times 10^{-1}} - \frac{1}{1+x} \right)$$