

$$\begin{aligned}
& \sum_{k=-\infty}^{\infty} \cos(k\pi/n) \sin(k\pi/s) \\
&= (1/2) \sum_{k=-\infty}^{\infty} \{ \sin[k\pi(1/n+1/s)] - \sin[k\pi(1/n-1/s)] \} \\
&= 0
\end{aligned}$$

$$\sum_{k=-\infty}^{\infty} \sin(k\pi/n) \cos(k\pi/s) = 0$$

$$\begin{aligned}
\sum_{k=-\infty}^{\infty} \left(\frac{\partial}{\partial \chi_k} \right)^2 &= \sum_{n=1}^{\infty} \sum_{s=1}^{\infty} (\infty + 1/2) \delta_{ns} \left(\frac{\partial}{\partial a_n} \frac{\partial}{\partial a_s} + \frac{\partial}{\partial b_n} \frac{\partial}{\partial b_s} \right) \\
&= (\infty + 1/2) \sum_{n=1}^{\infty} \left(\frac{\partial}{\partial a_n} \frac{\partial}{\partial a_n} + \frac{\partial}{\partial b_n} \frac{\partial}{\partial b_n} \right)
\end{aligned}$$

$$\begin{aligned}
\frac{i\hbar}{\alpha} \alpha \sum_{n=1}^{\infty} \left\{ \frac{\partial F}{\partial a_n} [a_n \cos(\pi/n) - b_n \sin(\pi/n) - a_n] \right. \\
\left. + \frac{\partial F}{\partial b_n} [b_n \cos(\pi/n) + a_n \sin(\pi/n) - b_n] \right\} \\
= \frac{1}{2m} \frac{1}{\alpha} (-i\hbar)^2 (\infty + 1/2) \sum_{n=1}^{\infty} \left[\left(\frac{\partial}{\partial a_n} \right)^2 + \left(\frac{\partial}{\partial b_n} \right)^2 \right] F
\end{aligned}$$