This condition will be satisfied if $\beta^j = \frac{i\pi j}{N+1}$ $j = 1$ to N

whence $\boxed{n_k^j = \alpha^j \sin \frac{k\pi j}{N+1}}$ We also get

$$2 - \gamma_j = 2\cosh \beta^j \Rightarrow 2 - \gamma_j = 2\cos \frac{\pi j}{N+1}$$

$$\text{or } \gamma_j = 2\left(1 - \cos \frac{\pi j}{N+1}\right) \Rightarrow \lambda_j = \frac{k}{m} 2\left(1 - \cos \frac{\pi j}{N+1}\right)$$

Whence $\boxed{\omega_j = \sqrt{\frac{k}{m}} \left[2\left(1 - \cos \frac{\pi j}{N+1}\right)\right]^{\frac{1}{2}}}$ $j = 1$ to N

Note that we can also write this result as

$$\boxed{\omega_j = 2\sqrt{\frac{k}{m}} \sin \frac{\pi j}{2(N+1)}}$$

As a check, set $N = 1$

$j = 1 \Rightarrow$

$\omega = 2\sqrt{\frac{k}{m}} \sin \frac{\pi}{4} = \sqrt{\frac{2k}{m}}$

which is correct for

fmom