$$x_b[n] = \frac{1}{2\pi}\left[\int_{-\frac{\pi}{3}}^{0} \frac{-3\Omega}{\pi} e^{j\Omega n} d\Omega + \int_{0}^{\frac{\pi}{3}} \frac{3\Omega}{\pi} e^{j\Omega n} d\Omega\right]$$

$$= \frac{3}{2\pi^2}\left[-\int_{-\frac{\pi}{3}}^{0} \Omega e^{j\Omega n} d\Omega + \int_{0}^{\frac{\pi}{3}} \Omega e^{j\Omega n} d\Omega\right]$$

using integration by parts

let;

$u = \Omega \qquad dv = e^{j\Omega n} d\Omega$

$du = d\Omega \qquad v = \frac{e^{j\Omega n}}{jn}$

Then,

$$\int \Omega e^{j\Omega n} d\Omega = \left.\frac{-j\Omega e^{j\Omega n}}{n}\right| + \frac{j}{n}\int e^{j\Omega n} d\Omega$$

$$= \left.\frac{-j\Omega e^{j\Omega n}}{n}\right| + \left.\frac{\cancel{j} e^{j\Omega n}}{\cancel{j} n^2}\right| = \left.\frac{e^{j\Omega n}}{n^2} - \frac{j\Omega e^{j\Omega n}}{n}\right|$$

$$x_b[n] = \frac{3}{2\pi^2}\left[\underbrace{-\left[\frac{e^{j\Omega n}}{n^2} - \frac{j\Omega e^{j\Omega n}}{n}\right]_{-\frac{\pi}{3}}^{0}}_{A} + \underbrace{\left[\frac{e^{j\Omega n}}{n^2} - \frac{j\Omega e^{j\Omega n}}{n}\right]_{0}^{\frac{\pi}{3}}}_{B}\right]$$

$$A = \left(\frac{1}{n^2}\right) - \left(\frac{e^{-j\frac{\pi}{3}n}}{n^2} + \frac{j\frac{\pi}{3} e^{-j\frac{\pi}{3}n}}{n}\right) = \frac{1}{n^2} - \frac{e^{-j\frac{\pi}{3}n}}{n^2} + \frac{jn\frac{\pi}{3} e^{-j\frac{\pi}{3}n}}{n^2}$$

$$A = \frac{1 - e^{-j\frac{\pi}{3}n} + jn\frac{\pi}{3} e^{-j\frac{\pi}{3}n}}{n^2}$$

$$B = \left(\frac{e^{j\frac{\pi}{3}n}}{n^2} - \frac{j\frac{\pi}{3} e^{j\frac{\pi}{3}n}}{n}\right) - \left(\frac{1}{n^2}\right) = \frac{e^{j\frac{\pi}{3}n} - jn\frac{\pi}{3} e^{j\frac{\pi}{3}n} - 1}{n^2}$$

$$x_b[n] = \frac{3}{2\pi^2}\left[-A + B\right] = \frac{3}{2\pi^2}\left[\frac{e^{-j\frac{\pi}{3}n} + e^{j\frac{\pi}{3}n} - jn\frac{\pi}{3} e^{-j\frac{\pi}{3}n} - jn\frac{\pi}{3} e^{j\frac{\pi}{3}n} - 2}{n^2}\right]$$

remember Eulers that says $\cos x = \frac{e^{jx} + e^{-jx}}{2}$

$$x_b[n] = \frac{3}{2n^2\pi^2}\left[\frac{1}{2}\cos\left(\frac{\pi}{3}n\right) - jn\frac{1}{2}\cos\left(\frac{\pi}{3}n\right) - \frac{4}{2}\right]$$

$$x_b[n] = \frac{3}{4n^2\pi^2}\left[\cos\left(\frac{\pi}{3}n\right) - n\sin\left(\frac{\pi}{3}n\right) - 4\right]$$