TAREA $V_{RMS} = \bar{P} = \frac{1}{T}\int |A\,sen(w_o t)|^2 dt$

$sen^2(wt) = \frac{1-cos(2wt)}{2}$

$V_{rms}^2 = \frac{1}{T}\int_0^T |A\,sen(w_o t)|^2 dt = \bar{P}$

formula general de RMS es: $x_{rms} = \sqrt{\frac{1}{T}\int_0^T x(t)^2 dt}$

$\bar{P} = \frac{1}{T}\int_0^T [A\,sen(wt)]^2 dt = \frac{A^2}{T}\int_0^T sen^2(wt)\,dt$

$\bar{P} = \frac{A^2}{T}\int_0^T \frac{1-cos(2wt)}{2} dt = \frac{A^2}{2T}\left[\int_0^T 1\,dt - \int_0^T cos(2wt)\,dt\right]$

$\bar{P} = \frac{A^2}{T}\left[[t]_0^t - \left[\frac{1}{2w_o} sen(2w_o t)\right]_0^T\right] = \frac{A^2}{T}\left[T-0\right] - \left[\frac{1}{2w_o}(sen(2wT) - sen(2w_o 0)\right]$

$= \frac{A^2}{T}\left[T - \frac{1}{2w_o}(sen(2w_o T))\right] \rightarrow T = \frac{2\pi}{w_o}$

$= \frac{A^2}{T}\left[T - \frac{1}{2w_o} sen\left(2 \times w_o \frac{2\pi}{w_o}\right)\right] = \frac{A^2}{T}\left[T - \frac{1}{2w_o} sen(4\pi)\right]$ ($sen(4\pi) \to 0$)

$= \frac{A^2}{2T}[T-0] = \frac{A^2}{2}$

$V_{rms}^2 = \frac{A^2}{2} \rightarrow \sqrt{V_{rms}^2} = \sqrt{\frac{A^2}{2}} \rightarrow V_{RMS} = \frac{A}{\sqrt{2}} \rightarrow V_{RMS} = \frac{V_{max}}{\sqrt{2}}$ ✓

Relación V_{RMS} - V_{max}

$V_{rms} = \sqrt{\frac{1}{T}\int_0^T (V_{max}\,sen(wt))^2 dt} \rightarrow V_{rms} = \frac{V_{max}}{\sqrt{2}}$ ✓ $\quad T = \frac{2\pi}{w_o}$

Relación I_{RMS} - I_{max}

La misma derestracción sirve para la corriente senoidal $i(t) = I_{max}\,sen(wt - \varphi)$ donde el desface (φ) no afecta la magnitud $\rightarrow I_{rms} = \frac{I_{max}}{\sqrt{2}}$ ✓

Relación entre V_{max}, I_{max} y la Potencia (con fase θ)

$v(t) = V_{max}\,sen(wt) \qquad i(t) = I_{max}\,sen(wt - \theta)$

$p(t) = v(t)i(t) = V_{max} I_{max}\,sen(wt)\,sen(wt - \theta)$

Identidad trigonométrica $sen A\,sen B = \frac{1}{2}[cos(A-B) - cos(A+B)]$

$p(t) = \frac{V_{max}}{\sqrt{2}} \cdot \frac{I_{max}}{\sqrt{2}}[cos(\theta) - cos(2wt - \theta)]$ ($0 \rightarrow$ promedio Periodo)

$p(t) = \frac{V_{max} I_{max}}{2} cos(\theta)$ ✓