Root mean square value in ac

Square root of average of square of instantenous current

Derivation of root mean square value in ac

$$
\begin{aligned}
i &= I\cos(\omega t) \\
i^2 &= I^2\cos^2(\omega t) \\
i^2 &= I^2\frac{1}{2}(1+\cos 2\omega t) \\
i^2 &= \frac{1}{2}I^2 + \frac{1}{2}I^2\cos 2\omega t \\
I_{rms} &= \frac{I}{\sqrt{2}}
\end{aligned}
$$

Expression for root mean square value in ac

$$I_{rms} = \frac{I}{\sqrt{2}}$$

Expression for root mean square value in ac in terms of magnitude

$$I_{rms} = 1.41 \times I$$