\[ 2 + \frac{3 + j4}{5 - j8} \]

Focus on 2nd term

Using rectangular notation, multiply by complex conjugate of the denominator in order to get a simple denominator.

\[
\begin{align*}
\frac{(3+j4)(5+j8)}{(5-j8)(5+j8)} &= \frac{(15+j24+j20-32)}{25-j40+j40+64} = \frac{-17+j44}{89} = -0.19 + j0.49
\end{align*}
\]

Final value, including "2" from problem statement

\[ 2 + (-0.19 + j0.49) = 1.8 + j0.49 \]
\[ = 1.86 \times 15.2 \quad \leftrightarrow \quad 1.86 \cos(wt + 15.2) \]

Using polar notation

\[ 3+j4 = \sqrt{3^2 + 4^2} \times \tan^{-1} \frac{4}{3} = 5 \times 53° \]
\[ 5-j8 = \sqrt{25+64} \times \tan^{-1} \frac{-8}{5} = 9.4 \times -58° \]

so \[ \frac{3+j4}{5-j8} = \frac{5 \times 53}{9.4 \times -58} = \left( \frac{5}{9.4} \right) \times (53 - (-58)) = 0.53 \times 111 \]

and back to rectangular coordinates in order to be able to add in the "2" from the original problem statement.

\[ z = x + jy = 0.53 \cos(111) + j0.53 \sin(111) = -0.19 + j0.49 \]
\[ 2 + x+jy = 1.8 + j0.49 \]
\[ = 1.86 \times 15.2 \quad \leftrightarrow \quad 1.86 \cos(wt + 15.2°) \]
\( 4x - 10 + \frac{1 - j^2}{3x^6} \)

3rd term: \( \frac{1-j^2}{3x^6} = \frac{\sqrt{5}x - 63}{3x^6} = 0.74x - 69 \)

\[
= 0.74 \cos(-69) + j 0.74 \sin(-69)
\]

\[
= 0.26 - j 0.69
\]

1st term:

\( 4x - 10 = 4 \cos(-10) + j 4 \sin(10) = 4 \cos(10) - j 4 \sin(10) \)

\( = 3.9 - j 0.69 \)

So \( (3.9 - j 0.69) + (0.29 - j 0.69) \)

\( = 4.19 - j 1.38 = 4.41 \times 18.2 \leftrightarrow 4.41 \cos(\omega t - 18.2^\circ) \)

**CAUTION USING CALCULATOR FOR TAN\(^{-1}\) (arctan)**

*You must keep track of which quadrant you are in*

Vector [1] is \( 2 - 3j \)

\[= \sqrt{13} \times \tan^{-1}\left(\frac{3}{2}\right) \]

\[= 3.6 \times -56^\circ \]

Vector [2] is \( -2 + 3j \)

\[= \sqrt{13} \times \tan^{-1}\left(-\frac{3}{2}\right) \]

\[= 3.6 \times -56^\circ \]

\[\neq \text{vector [1]} \]

Clearly they are not both vectors with phase \(-56^\circ\)

*You must be aware of what your calculator calculates for you, and determine vector [2] phase is \(180 - 56 = 124^\circ\)*