b) (cont.) If phasor $\mathbf{F} = 2.5 + j3.2$, find $\mathcal{P}^{-1}\{\mathbf{F}\}$.

Soln: $\mathcal{P}^{-1}\{Re^{j\phi}\} = R\cos(\omega t + \phi)$ in general

also, $\mathcal{P}^{-1}\{Re^{j\phi}\} = Re\{Re^{j\phi}e^{j\omega t}\}$ in general

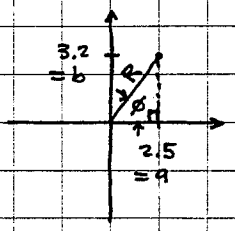
(In other words, $R\cos(\omega t + \phi) = Re\{Re^{j\phi}e^{j\omega t}\}$.)

We need polar form of $\mathbf{F}$:

$R = \sqrt{2.5^2 + 3.2^2}$ $\quad \phi = \tan^{-1}\frac{3.2}{2.5}$

$= 4.06$ $\quad = 52^\circ$

picture for conversion to polar coords:



$R = \sqrt{a^2+b^2}$ $\quad \phi = \tan^{-1}\frac{b}{a}$

hypotenuse of right triangle

$\tan\phi = \frac{\text{side opposite}}{\text{side adjacent}}$

$\mathcal{P}^{-1}\{\mathbf{F}\} = \mathcal{P}\{4.06\,e^{j52^\circ}\} = 4.06\cos(\omega t + 52^\circ)$

Note: ωt is always in units of radians. Convert 52° to radians (i.e. mult by $\pi/180$) before evaluating $\omega t + 52^\circ$. $\quad 52^\circ = 52^\circ \cdot \frac{\pi\ \text{rad}}{180^\circ} = 0.908\ \text{rad}.$