I

$$z_1 = a + jb \Rightarrow z_1 = r_1 e^{j\theta_1}$$

$$z_2 = c + jd \Rightarrow z_2 = r_2 e^{j\theta_2}$$

$$\frac{z_1}{z_2} = \frac{a+jb}{c+jd} \Rightarrow \frac{r_1 e^{j\theta_1}}{r_2 e^{j\theta_2}} = \frac{r_1}{r_2} e^{j(\theta_1 - \theta_2)}$$

$\left(\frac{r_1}{r_2}\right)$ is the magnitude in polar form

$$\Rightarrow \left|\frac{z_1}{z_2}\right| = \frac{r_1}{r_2} \Rightarrow \frac{\sqrt{a^2+b^2}}{\sqrt{c+d^2}} \quad (*)$$

II $$\frac{a+jb}{c+jd} = \frac{(a+jb)(c-jd)}{(c+jd)(c-jd)} = \left(\frac{ac+bd}{c^2+d^2}\right) + \left(\frac{bc-ad}{c^2+d^2}\right)j$$

$$\left|\frac{a+jb}{c+jd}\right| = \sqrt{\left(\frac{ac+bd}{c^2+d^2}\right)^2 + \left(\frac{bc-ad}{c^2+d^2}\right)^2} \quad (**)$$

$$(*) = (**)$$