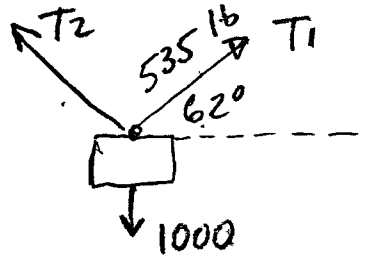
Mth 113 Friday 3-22-13 Class Notes

(10) Pg 238 A sign is suspended between two buildings, ONE cable from which the sign is suspended has a tension of 535 lbs and acts at an angle of elevation of 62°. If the weight of the sign is 1000 lbs, find the tension and angle of elevation of the other cable, to the nearest unit.



$T_1(535, 62)$
$-T_1(535, 242°)$
$W(1000, 270°)$
$-W(1000, 90°)$

$W + T_1 + T_2 = 0$

$T_2 = -W + -T_1$

$-W_x \Rightarrow 1000 \cos 90° = 0$

$-T_{1x} \Rightarrow 535 \cos 242° = \underline{-251.167}$

$T_{2x} \therefore -251.167$

$-W_y \Rightarrow 1000 \sin 90° = 1000$

$-T_{1y} \Rightarrow 535 \sin 242° = \underline{-472.377}$

$T_{2y} = 527.623$

QII $T_2(-251.167, 527.623)$

$|T_2| = \sqrt{(-251.167)^2 + (527.623)^2} = 584.355$

$\theta' = \tan^{-1}\left(\left|\frac{527.623}{-251.167}\right|\right) = 64.544°$ = Angle of Elevation

(92) $z = 4+2i$ * Find $(i)(z)$, $(i^{-2})(z)$, and $(i^3)z$

Pg 251

$|z| = \sqrt{4^2+2^2} = \sqrt{20} = 2\sqrt{5}$

QI $\theta = \theta' = \tan^{-1}\left(\frac{2}{4}\right) = 26.565^\circ$

$\therefore z = 2\sqrt{5}\,\text{Cis}(26.565^\circ)$

$i \equiv 0+1i \Rightarrow |r| = \sqrt{0^2+1^2} = 1$

$\theta = 90^\circ$

$\therefore i = 1\,\text{Cis}(90^\circ)$

$\therefore (z)(i) = \left[2\sqrt{5}\,\text{Cis}(26.565^\circ)\right]\left[1\,\text{Cis}(90^\circ)\right]$

$= (2\sqrt{5})(1)\,\text{Cis}(26.565^\circ + 90^\circ)$

$(z)(i) = 2\sqrt{5}\,\text{Cis}(116.565^\circ)$

Rect. Form

$= 2\sqrt{5}\cos(116.565) + 2\sqrt{5}\sin(116.565)\,i$

$-1.9999 + 4.000\,i$

$= \boxed{-2+4i}$ *

(89) p253 $I = \sqrt{\frac{P}{Z}}$ $P = 5+2i$ $Z = 1-4i$

$I = ?$ Rect. Form, $k=0$, Nearest .01

$P = 5+2i \Rightarrow |P| = \sqrt{29}$, $\theta = \theta' = \tan^{-1}\left(\frac{2}{5}\right)$

$\theta = 21.8014°$

$\therefore P = \sqrt{29}\,\mathrm{Cis}(21.8014°)$

$Z = 1-4i \Rightarrow |Z| = \sqrt{17}$, $\theta' = \tan^{-1}\left(\frac{4}{1}\right) = 75.9638°$

$\therefore Z = \sqrt{17}\,\mathrm{Cis}(284.0362°)$ @ IV $\theta = 360 - \theta' = 284.0362°$

$$\frac{P}{Z} = \frac{\sqrt{29}}{\sqrt{17}}\,\mathrm{Cis}(21.8014 - 284.0362°)$$

$= 1.3061\,\mathrm{Cis}(-262.2348) = 1.3061\,\mathrm{Cis}(97.7652°)$

$\therefore I = \left[1.3061\,\mathrm{Cis}(97.7652°)\right]^{\frac{1}{2}}$

$I = \left(\frac{P}{Z}\right)^{\frac{1}{2}} = (1.3061)^{\frac{1}{2}}\,\mathrm{Cis}\left(\frac{97.7652}{2}\right)$, $k=0$

$I = 1.1428\cos(48.8826) + 1.1428\sin(48.8826)\,i$

$I = .7515 + .8609\,i$

$I = .75 + .86\,i$