MAC 1114/1147 Chapter 10 Test

Polar Coordinates Formulas

$x = r\cos(\theta)$ $\quad y = r\sin(\theta)$ $\quad r^2 = x^2 + y^2$ $\quad \theta = \tan^{-1}\left(\frac{y}{x}\right)$

Complex Number Formulas

$z = r\left(\cos(\theta) + i\sin(\theta)\right)$ or $z = r\cos(\theta) + r\sin(\theta)i$

$z_1 z_2 = r_1 r_2\left[\cos(\theta_1 + \theta_2) + i\sin(\theta_1 + \theta_2)\right]$ $\quad \frac{z_1}{z_2} = \frac{r_1}{r_2}\left[\cos(\theta_1 - \theta_2) + i\sin(\theta_1 - \theta_2)\right]$

$z^n = r^n\left[\cos(n\theta) + i\sin(n\theta)\right]$, where $n \geq 1$ is a positive integer

$\sqrt[n]{z} = \sqrt[n]{r}\left[\cos\left(\frac{\theta_0 + 2\pi k}{n}\right) + i\sin\left(\frac{\theta_0 + 2\pi k}{n}\right)\right]$, $n \geq 2$ is an integer, $k = 0, 1, 2, \ldots, n-1$

Vector Formulas

$\|\vec{v}\| = \sqrt{a^2 + b^2}$ $\quad \vec{u} = \frac{\vec{v}}{\|\vec{v}\|}$ $\quad \vec{v} = \|\vec{v}\|\left(\cos(\alpha)\hat{i} + \sin(\alpha)\hat{j}\right)$

Vector Projections: $\vec{v}_1 = \frac{\vec{v} \bullet \vec{w}}{\|\vec{w}\|^2}\vec{w}$ $\quad \vec{v}_2 = \vec{v} - \vec{v}_1$