$z = x + yj$

$Re\left(\frac{\bar{z} + j}{z - 1}\right) \geq 1$

$Re\left[\frac{x - yj + j}{x + yj - 1}\right] = Re\left[\frac{x + (1-y)j}{x - 1 + yj} \cdot \frac{(x-1) - yj}{(x-1) - yj}\right] = Re\left[\frac{x(x-1) - xyj + (x-1)(1-y)j + (1-y)y}{(x-1)^2 + y^2}\right]$

$= \frac{x(x-1) + y(1-y)}{(x-1)^2 + y^2} \geq 1$

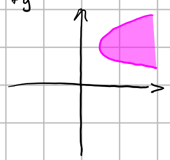
$x(x-1) + y(1-y) \geq (x-1)^2 + y^2$

$\cancel{x^2} - x + y - y^2 \geq \cancel{x^2} - 2x + 1 + y^2$

$0 \geq 2y^2 - y + x + 1$

$x \leq -2y^2 + y - 1$

$x \geq 2y^2 - y + 1$



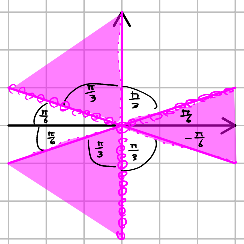
2.

$jz^4 = \bar{z} \cdot |z^2|$

$\varphi = -\frac{\pi}{12} + \frac{\pi}{3}k$

3. $0 \leq \arg(jz^3) < \pi$ $\quad z \neq 0$

$jz^3 = e^{\frac{\pi}{2}j} r^3 e^{3\varphi j} = r^3 e^{(3\varphi + \frac{\pi}{2})j}$

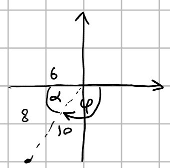


$0 + 2k\pi \leq 3\varphi + \frac{\pi}{2} < \pi + 2k\pi$

$-\frac{\pi}{2} + 2k\pi \leq 3\varphi < \frac{\pi}{2} + 2k\pi$

$-\frac{\pi}{6} + \frac{2k\pi}{3} \leq \varphi < \frac{\pi}{6} + \frac{2k\pi}{3}$

4. $-6 - 8j$



$\alpha = \arctan\left(\frac{4}{3}\right)$

$\arg(-6 - 8j) = \varphi = -\pi + \arctan\left(\frac{4}{3}\right)$

5.

$\sqrt[n]{1} = \left\{ e^{\frac{2k\pi}{n}j} : k \in \mathbb{Z} \wedge 0 \leq k < n \right\}$

6.

$z^4 = (jz + 1)^4$

$z^4 - (jz+1)^4 = (z^2 - (jz+1)^2)(z^2 + (jz+1)^2)$

$= (z - (jz+1))(z + (jz+1))(z - j(jz+1))(z + j(jz+1))$

$= (z - jz + 1)(z + jz + 1)(z + z - j)(z - z + j)$

$= [z(1-j) + 1][z(1+j) + 1][2z - j] \cdot j$

$z_0 = \frac{-1}{1-j} \qquad z_1 = \frac{-1}{1+j} \qquad z_2 = \frac{j}{2}$