Exercício 23, alínea a)

$$w = \frac{i + iz}{1 - z} \Leftrightarrow w - wz = i + iz \Leftrightarrow -wz - iz = -w + i \Leftrightarrow z = \frac{w - i}{w + i}$$

$A = \{z \in \mathbb{C}: \quad |z| = 1 \ \}$

$A' = \left\{w \in \mathbb{C}: \quad \left|\frac{w - i}{w + i}\right| = 1 \ \right\}$

$$\left|\frac{w - i}{w + i}\right| = 1 \Leftrightarrow \frac{|w - i|}{|w + i|} = 1 \Leftrightarrow |w - i| = |w + i| \Leftrightarrow x^2 + (y - 1)^2 = x^2 + (y + 1)^2$$

$$\Leftrightarrow -4y = 0 \Leftrightarrow y = 0$$

$A' = \{w \in \mathbb{C}: \quad Im(w) = 0 \ \} = \{w = x + yi \in \mathbb{C}: \quad y = 0 \ \}$

Exercício 23, alínea b)

$$w = \frac{i + iz}{1 - z} \Leftrightarrow w - wz = i + iz \Leftrightarrow -wz - iz = -w + i \Leftrightarrow z = \frac{w - i}{w + i}$$

$B = \{z \in \mathbb{C}: \quad |z - 1| > |z + 1| \ \}$

$B' = \left\{w \in \mathbb{C}: \quad \left|\frac{w - i}{w + i} - 1\right| > \left|\frac{w - i}{w + i} + 1\right| \ \right\}$

$$\left|\frac{w - i}{w + i} - 1\right| > \left|\frac{w - i}{w + i} + 1\right| \Leftrightarrow \left|\frac{w - i}{w + i} - \frac{w + i}{w + i}\right| > \left|\frac{w - i}{w + i} + \frac{w + i}{w + i}\right|$$

$$\Leftrightarrow \left|\frac{w - i - w - i}{w + i}\right| > \left|\frac{w - i + w + i}{w + i}\right|$$

$$\Leftrightarrow \left|\frac{-2i}{w + i}\right| > \left|\frac{2w}{w + i}\right|$$

$$\Leftrightarrow \frac{|-2i|}{|w + i|} > \frac{|2w|}{|w + i|}$$

$$\Leftrightarrow |-2i| > |2w|$$

$$\Leftrightarrow |-i| > |w|$$

$$\Leftrightarrow 1 > |w|$$

$$\Leftrightarrow |w| < 1$$

$B' = \{w \in \mathbb{C}: \quad |w| < 1 \ \} = \{w = x + yi \in \mathbb{C}: \quad x^2 + y^2 < 1 \ \}$