

$$|e^z| = e^{\operatorname{Re} z}$$

$$|e^x (\cos y + i \sin y)| = e^{\sqrt{x^2 + y^2}}$$

$$|e^x \cos y + i e^x \sin y| = e^{\sqrt{x^2 + y^2}}$$

$$\sqrt{(e^x \cos y)^2 + (e^x \sin y)^2} = e^{\sqrt{x^2 + y^2}}$$

$$\sqrt{e^{2x} \cos^2 y + e^{2x} \sin^2 y} = e^{\sqrt{x^2 + y^2}}$$

$$e^x = e^{\sqrt{x^2 + y^2}}$$

$$x = \sqrt{x^2 + y^2}$$

$$x^2 = x^2 + y^2$$

$$y^2 = 0 \quad y = 0$$

$$z = x$$