ÜSTEL FONKSİYONLAR

$$z = x + \boldsymbol{i}\,y$$

$$f(z) = e^{z} = e^{x+\boldsymbol{i}y} = e^{x}e^{\boldsymbol{i}y}$$

$$= e^{x}(\cos y + \boldsymbol{i}\sin y)$$

$$f(z) = u(x,y) + \boldsymbol{i}\,v(x,y)$$

$$u(x,y) = e^{x}\cos y \qquad v(x,y) = e^{x}\sin y$$

$$e^0 = 1 \qquad , \qquad \frac{1}{e^z} = e^{-z}$$

$$\frac{e^{z_1}}{e^{z_2}} = e^{z_1 - z_2}$$

$$(e^z)^n = e^{zn} \qquad n = 0, \pm 1, \pm 2 \ldots\ldots$$

$$e^{2\pi \boldsymbol{i}} = 1 \;\Rightarrow\; e^{z + 2\pi \boldsymbol{i}} = e^z$$

$$\frac{d}{dz} e^{\boldsymbol{i} z} = \boldsymbol{i}\, e^{\boldsymbol{i} z}$$

$$\left| e^z \right| = \left| e^{x + \boldsymbol{i} y} \right| = e^x$$

TRİGONEMETRİK FONKSİYONLAR

$$e^{\pm i x} = \cos x \pm \boldsymbol{i} \sin x$$

$$\sin z = \frac{e^{iz} - e^{-iz}}{2\boldsymbol{i}}$$

$$\cos z = \frac{e^{iz} + e^{-iz}}{2}$$

$$\frac{d}{dz}\cos z = -\sin z$$

$$\frac{d}{dz}\sin z = \cos z$$

$$\sin(-z) = -\sin(z)$$

$$\cos(-z) = \cos(z)$$

$$\sin(z_1 + z_2) = \sin z_1 \ \cos z_2 + \cos z_1 \ \sin z_2$$

$$\cos(z_1 + z_2) = \cos z_1 \cos z_2 - \sin z_1 \sin z_2$$

$$\sin^2 z + \cos^2 z = 1$$

$$\sin 2z = 2 \sin z \cos z$$

$$\cos 2z = \cos^2 z - \sin^2 z$$

$$\sin(z + \frac{\pi}{2}) = \cos z$$

$$\sin(z - \frac{\pi}{2}) = -\cos z$$

$$|\sin z|^2 = \sin^2 x + \sinh^2 y$$

$$|\cosh z|^2 = \cos^2 x + \sinh^2 y$$

$$\sin z = 0 \quad \text{ancak ve ancak} \quad z = n\pi \quad n = 0, \pm 1, \pm 2 \ldots$$

$$\cos z = 0 \quad \text{ancak ve ancak} \quad z = \frac{\pi}{2} + n\pi \quad n = 0, \pm 1, \pm 2 ..$$

$$\tan z = \frac{\sin z}{\cos z} \qquad \cot z = \frac{\cos z}{\sin z}$$

$$\sec z = \frac{1}{\cos z} \qquad \operatorname{cosec} z = \frac{1}{\sin z}$$

- y reel sayı olduğu zaman hiperbolik fonksiyonlar tanımlanabilir.

$$\sinh y = \frac{e^{y} - e^{-y}}{2} \qquad \cosh y = \frac{e^{y} + e^{-y}}{2}$$

$z_1 = x$ ve $z_2 = \boldsymbol{i}\, y$ olmak üzere

$$\sin(z_1 + z_2) = \sin(x + \boldsymbol{i}\, y) = \sin x \cosh y + \boldsymbol{i} \cos x \sinh y$$

$$\cos(z_1 + z_2) = \cos(x + \boldsymbol{i}\, y) = \cos x \cosh y - \boldsymbol{i} \sin x \sinh y$$

$$\sin(\boldsymbol{i}\, y) = \boldsymbol{i} \sinh y$$

$$\cos(\boldsymbol{i}\, y) = \cosh y$$

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