

$$f[z_] = 1 / (z^3 + 1)$$

$$\frac{1}{1 + z^3}$$

$$z1 = -1; z2 = \cos[\pi / 3] + i \sin[\pi / 3]; z3 = \cos[5 \pi / 3] + i \sin[5 \pi / 3];$$

$$z1$$

$$-1$$

$$res1 = i \operatorname{Limit}[f[z] (z - z1), z \rightarrow z1]$$

$$\frac{i}{3}$$

$$\text{In[4]:= } \cos[\pi / 6] + i \sin[\pi / 6]$$

$$\text{Out[4]= } \frac{i}{2} + \frac{\sqrt{3}}{2}$$

$$res2 = \text{FullSimplify}[(\cos[\pi / 6] + i \sin[\pi / 6]) \operatorname{Limit}[f[z] (z - z2), z \rightarrow z2]]$$

$$-\frac{i}{3}$$

$$\text{In[5]:= } \cos[5 \pi / 6] + i \sin[5 \pi / 6]$$

$$\text{Out[5]= } \frac{i}{2} - \frac{\sqrt{3}}{2}$$

$$res3 = \text{FullSimplify}[(\cos[5 \pi / 6] + i \sin[5 \pi / 6]) \operatorname{Limit}[f[z] (z - z3), z \rightarrow z3]]$$

$$-\frac{i}{3}$$

$$\text{FullSimplify}[2 \pi i (res1 + res2 + res3)]$$

$$\frac{2 \pi}{3}$$