# Problems - Sections 72, 73, 74

(2a) Compute

$$\operatorname*{Res}_{-1} \frac{z^{\frac{1}{4}}}{z+1}$$

when the branch cut is at 0.

(2b) Compute

$$\operatorname*{Res}_{i} \frac{\operatorname{Log} z}{(z^2+1)^2}$$

where we are using the principal branch.

(2c) Compute

$$\operatorname*{Res}_{i} \frac{z^{\frac{1}{2}}}{(z^2+1)^2}$$

when the branch cut is at 0.

(3) Evaluate the integral of $f(z) = \frac{3z^3+2}{(z-1)(z^2+9)}$ around the following two contours.

   (a) The contour $C_a$, the circle $|z - 2| = 2$ positively oriented.

   (b) The contour $C_b$, the circle $|z| = 4$ positively oriented.

(4) Evaluate the integral of $\frac{1}{z^3(z+4)}$ around the following two contours.

   (a) The contour $C_a$, $|z| = 2$ positively oriented.

   (b) The contour $C_b$, $|z + 2| = 3$ positively oriented.