

1. Find a function  $w = f(z)$  which maps the unit disk  $|z| < 1$  to the disk with center at  $5i$  and radius 3. Find also the inverse function.
2. Find a function  $w = f(z)$  which maps the right half plane  $\operatorname{Re} z > 0$  to the half plane defined by the line  $\operatorname{Re} z = -2$  and containing the point  $-5$ . Find also the inverse function.
3. Find a function  $w = f(z)$  which maps the right half plane  $\operatorname{Re} z > 0$  to the half plane defined by the line  $\operatorname{Im} z = -2$  and containing the point  $5$ . Find also the inverse function.
4. Find a function  $w = f(z)$  which maps the upper half plane  $\operatorname{Im} z > 0$  to the half plane defined by the line  $x + y = 1$  and containing the point  $5$ . Find also the inverse function.
5. Define  $f(z) = 1/z$ . Find the set  $f(E)$  for the following sets  $E$ :

$$(a) E = \left\{ \frac{1}{2} < |z| < 1 \right\}, \quad (b) E = \left\{ \frac{1}{2} < |z| < 2 \right\}, \quad (c) E = \{0 < |z| \leq 1\}, \quad (d) E = \left\{ 0 < \operatorname{Arg} z < \frac{\pi}{4} \right\}.$$