

### Section 20-22 Problems

(20.8a) Show that  $f(z) = \operatorname{Re} z$  is not differentiable for any  $z$  by showing the limit in the definition of the derivative doesn't exist.

(23.1b) Using the Cauchy-Riemann equations, show that  $f(z) = z - \bar{z}$  is not differentiable for any  $z$ .

(23.1d) Using the Cauchy-Riemann equations, show that  $f(x + iy) = e^x e^{-iy}$  is not differentiable for any  $z$ .

(23.3a) Suppose  $f(z) = \frac{1}{z}$ . Using the Cauchy-Riemann equations, determine where  $f'(z)$  exists and give its value for the  $z$  when it does exist.

(23.3b) Suppose  $f(x + iy) = x^2 + iy^2$ . Using the Cauchy-Riemann equations, determine where  $f'(z)$  exists and give its value for the  $z$  when it does exist.