Homework.

1.1 \((x^3 - 3xy^2) + i(3x^2y - y^3)\).
1.6 \(e^x \cos(y) + ie^x \sin(y)\).
1.9 \(x/(x^2 + y^2) - i(y/x^2 + y^2)\).
2.22 Not analytic.
2.23 Analytic for \(z \neq 0\). (This is \(1/z\)).
2.34 \(-z - z^2/2 - z^3/3 - \cdots\). Radius of convergence 1, as the singularity closest to 0 is \(z = 1\).
2.36 \(1 + (1/2)z^2 + (1/2)(-1/2)z^4/2! + (1/2)(-1/2)(-3/2)z^6/3! + \cdots\). Nearest singularity is at \(z^2 = -1\), so \(z = \pm i\). So radius of convergence is 1.
2.39 Singularities are at \(z = \pm 3i\), so radius of convergence = 3. Power series is \(z/9(1 + z^2/9) = z/9 - z^{3}/9^{2} + z^{5}/9^{3} - \cdots\).
2.54 \(f(z) = -iz, v(x, y) = -x\).
2.55 \(f(z) = -iz^3, v(x, y) = -x^3 + 3xy^2\).
2.56 \(f(z) = -iz^2/2, v(x, y) = (y^2 - x^2)/2\).
2.59 \(f(z) = e^z, v(x, y) = e^x \sin(y)\).
2.60 \(f(z) = 2 \log(z), v(x, y) = 2 \arg(y/x)\), at least for \(\Re(x) > 0\).