1. Using the Cauchy residue theorem evaluate the integral of each of the following functions around the circle $|z| = 3$ taken in the positive sense.

$$(a)\ \frac{\exp(-z^2)}{z^5}; \quad (b)\ \frac{\exp(-z)}{(z-1)^3}; \quad (c)\ \frac{z+3}{z^2-2z}.$$

2. Problem 4, page 230 of text.

3. Evaluate the contour integrals of the following functions about the circle $|z| = 3$ centered at the origin, taken in the positive sense, obtaining in each case the value zero. Calculate first by using multiple residue theory, then repeat using the single residue method of section 64 of the text. Why is the second method justified in these integrals?

$$(a)\ \frac{z+1}{2z^3-3z^2-2z}; \quad (b)\ \frac{z+2}{z^3(z^2+4)}$$

4. Problem 5, page 245 of text. You may assume the result of exercise 7, section 41.

5.* Evaluate the integral

$$\int_{-\infty i}^{+\infty i} \frac{dz}{z^3-z^2-2z+2}.$$

(The integral is along the imaginary axis.)

6. Use the result in problem 5 to get the value of the real integral

$$\int_{-\infty}^{+\infty} \frac{1}{(x^2+2)(x^2+1)} dx.$$