*Evaluate the integral \( \oint_C f(z) \, dz \) where \( C \) is the unit circle enclosing the origin, where \( f(z) \) is given by:

a) \( \log(z - z_0), \ z_0 > 1 \)  

b) \( z/(z^2 + a^2), \ |a| < 1 \)

*Evaluate the integral

\[
\oint_C \left( \frac{2e^{iz}}{z} + \frac{1}{z - \pi} \right) \, dz
\]

where \( C \) is:

a) boundary of the annulus between circles of radius 1 and radius 4, centers at the origin.

b) a circle of radius \( R \), where \( R > 5 \), center at the origin.

You may use power series representations, see e.g.: eq. (1.2.19), in this and the next problem.

*Evaluate the integral \( \oint_C f(z) \, dz \) where \( C \) is the unit circle enclosing the origin, where \( f(z) \) is given below.

a) \( f(z) = e^{z^2}/z \)  

b) \( f(z) = \sin z/z^4 \)

Solve: 2.6.2 c, d

*Solve (XC): 2.6.3

*Solve: 2.6.7

*Solve: Discuss whether the sequence \( \{1/(nz)^3\}_{1}^{\infty} \) converges and whether the convergence is uniform for: \( 0 < \alpha < |z| < 1 \). Discuss whether the convergence is uniform if \( \alpha = 0 \)
*Solve: 3.1.5 a, c

*Solve: Find the radius of convergence of the series $\sum_0^\infty a_n(z)$ where $a_n(z)$ is given by

a) $z^{2n}$  

b) $n^n z^n$

*Solve 3.2.2 b, d, f

*Solve 3.2.7, 3.2.8

*Solve (XC): 3.2.10