

Problem 5.1 (Residue theory)

Compute the following integrals:

- a) Problem 14.7.17 in Boas
- b) Problem 14.7.24 in Boas
- c) $I = \oint_C \frac{\cos(z-1)dz}{(z+1)(z-2)}$. Integration path C : the circle $|z| = 3$ around the origin.
- d) $I = \oint_C \frac{dz}{e^z(z^2-1)^2}$. Integration path C : the circle $|z| = 2$ around the origin.

Problem 5.2 (First order differential equations)

Solve the following DEs using the technique of integrating factors:

- a) $dy + (2xy - xe^{-x^2})dx = 0$
- b) $y' + y \cos x = \sin 2x$
- c) $y' \cos x + y = \cos^2 x$

Problem 5.3: (Second order homogeneous DE with constant coefficients)

The relevant material for this will be lectured on Wednesday 26th. Meanwhile you can find the necessary methods in chapter 8.5 in Boas:

- a) $4y'' + 12y' + 9y = 0$
- b) $y'' - 4y' + 13y = 0$