Homework 4

Answers should be submitted, as both a tex file and a pdf file, to both me and the teaching assistants. You may use this file as a template.

Q4.1. Calculate

$$\int_0^\infty \frac{\sin(px)}{x}\,dx \tag{Q4.1.1}$$

for $p \in \mathbb{R}$.

Use PGF to draw a diagram illustrating your answer.

Q4.2. Calculate

$$\int_0^1 \frac{da}{z-a} \tag{Q4.2.1}$$

Compare the holomorphic structure of Eq. (Q4.2.1) with that of your answer.

Calculate

$$\int_C dz \int_0^1 \frac{da}{z-a} \tag{Q4.2.2}$$

where C is an anticlockwise loop around 0 and 1. Check your answer by reversing the order of integration.

Use PGF to draw a diagram illustrating your answer.