1. Compute the following integrals. The contour of integration can be any curve that joins the two points.

$$(a)\oint_{i}^{i/2} e^{\pi z}\,dz, \quad (b)\oint_{0}^{\pi+2i} \cos\frac{z}{2}\,dz, \quad (c)\oint_{1}^{3}(z-2)^3\,dz.$$

2. Let C be a simple closed curve that does not go through the point z_0. If $n \in \mathbb{Z}\setminus\{0\}$ show that

$$\oint_C (z-z_0)^{n-1}\,dz = 0.$$

What happens if $n = 0$?

3. Let C be the circle with center at 0 and radius 1/2, positively oriented. Compute

$$\oint_C \frac{dz}{z(z-1)}.$$

Hint: $\dfrac{1}{z(z-1)} = \dfrac{1}{z-1} - \dfrac{1}{z}$.