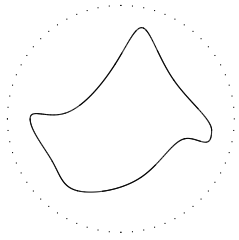


MA30056: Complex Analysis

SELF-ASSESSMENT SHEET 5: CAUCHY'S THEOREM

Let $D = B_1(0)$, the open unit disk. Which of the following functions f and contours Γ shown in the figures satisfy the hypotheses of Cauchy's Theorem (Theorem III.2.2) in D ? In each case the dotted circle is $\partial B_1(0)$ (i.e., the circle given by $|z| = 1$). Justify your answers!

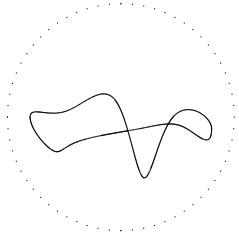
(a)



Function: $f(z) = \frac{1}{z}$

For the solution, click on the following line:

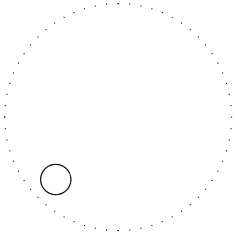
(b)



Function: $f(z) = e^z$

For the solution, click on the following space:

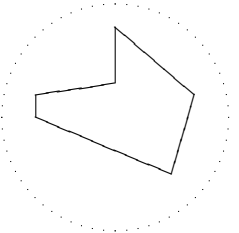
(c)



Function¹: $f(z) = \text{Log } z$

For the solution, click on the following line:

(d)

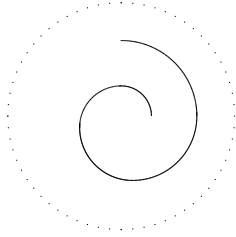


Function: $f(z) = \frac{1}{z-3}$

For the solution, click on the following space:

¹For the definition of $z \mapsto \text{Log } z$, see Question 1 on Exercise Sheet 6.

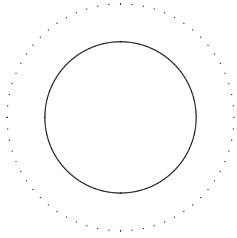
(e)



Function: $f(z) = z^2$

For the solution, click on the following line:

(f)



Function: $f(z) = |e^z|$

For the solution, click on the following line:
