Norges teknisk–naturvitenskapelige universitet
Institutt for matematiske fag

TMA4120 Matematikk 4K H2009

Øving 9

Oppgavene er hentet fra Kreyszig *Advanced Engineering Mathematics* 9. utgave.

1 (K9 14.1:6)
Find and sketch the path and its orientation given by:

$$z(t) = 3 + 4i + 5e^{it}$$

2 (K9 14.1:20)
Integrate by the first method (antidifferentiation) or state why it does not apply and then use the second method (path integration).

$$\int_C \mathrm{Re} z dz, \quad C \text{ the parabola } y = x^2 \text{ from 0 to } 1 + i.$$

3 (K9 14.1:20)
Integrate by the first method (antidifferentiation) or state why it does not apply and then use the second method (path integration).

$$\int_C (z + z^{-1}) dz \quad C \text{ the unit circle (counterclockwise)}$$

4 (K9 14.2:10)
Integrate $f(z) = \bar{z}^2$, indicating whether Cauchy's integral theorem applies.

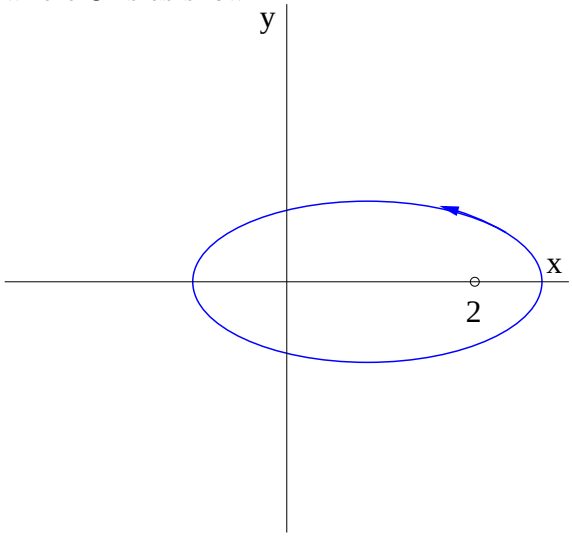
5 (K9 14.2:14a)
For what contours C will it follow from Theorem 1 that

$$\oint_C \frac{dz}{z} = 0?$$

6 (K9 14.2:22)
Evaluate

$$\oint_C \frac{7z - 6}{z^2 - 2z} dz$$

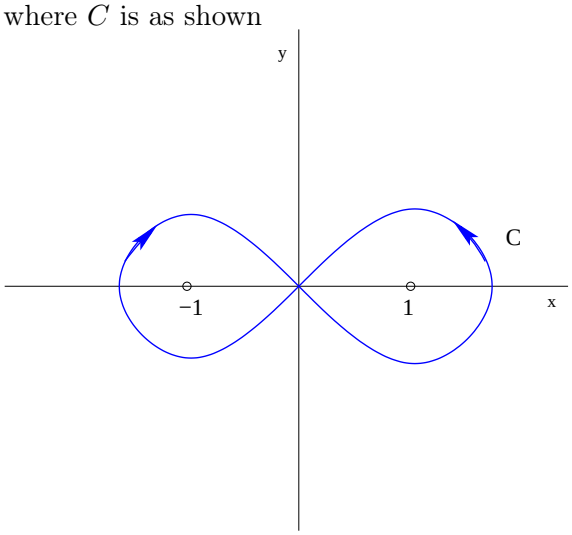
where C is as shown



7 (K9 14.2.23)
Evaluate

$$\oint_C \frac{dz}{z^2-1}$$

where C is as shown



8 (K9 14.2.30)
Evaluate

$$\oint_C \frac{\tan(z/2)}{z^4-16}dz,$$

where C is the boundary of the square with vertices $\pm 1, \pm i$ (clockwise).

9 (K9 17.1.13)
Find and sketch or graph the image of the region $\ln 3 < x < \ln 5$ under the mapping $w = e^z$