

Oppgaver til øving 13

November 13, 2020

16.4

16.4:2

Evaluate the integral

$$\int_0^{\pi} \frac{1}{\pi + 3 \cos \theta} d\theta,$$

showing details of your calculation.

16.4:5

Evaluate the integral

$$\int_0^{2\pi} \frac{\cos^2 \theta}{5 - 4 \cos \theta} d\theta,$$

showing details of your calculation.

16.4:12

Evaluate the improper integral

$$\int_{-\infty}^{+\infty} \frac{1}{(x^2 - 2x + 5)^2} dx,$$

showing details of your calculation.

Extra

1)

Calculate the integral

$$\oint_{|z|=2020} z^2 e^{\frac{1}{z}} dz.$$

2)

Calculate the integral

$$\int_{-\infty}^{+\infty} \frac{e^{px}}{1+e^x}$$

for $0 < p < 1$. **Hint:** integrate along the contour given by the rectangle in the complex plane with vertices $\pm L$ and $2\pi i \pm L$ and then send $L \rightarrow +\infty$. As $L \rightarrow +\infty$, the integrals over the short sides of the rectangle tend to 0.