Complex Analysis I:
Problem Set VIII

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Abstract

This work contains the solutions to the problem set VIII of Complex Analysis I 2015 at Courant Institute of Mathematical Sciences.

Question 1. 273-12.
Solution.

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Question 287-1.
Solution. Observe that the following equality holds, by the linearity of integration:

$$\int_0^{2\pi} \frac{d\theta}{5 + 4\sin\theta} \;\; = \;\; \frac{1}{5}\int_0^{2\pi} \frac{d\theta}{1 + \frac{4}{5}\sin\theta}$$

From the example 1 from pg.285 in the section 92, it follows that

$$\begin{aligned}
\int_0^{2\pi} \frac{d\theta}{5 + 4\sin\theta} &= \frac{1}{5}\int_0^{2\pi} \frac{d\theta}{1 + \frac{4}{5}\sin\theta} \\
&= \frac{1}{5}\frac{2\pi}{\sqrt{1 - \frac{4}{5}^2}} \\
&= \frac{1}{5}\frac{2\pi}{\frac{3}{5}} \\
&= \frac{2}{3}\pi.
\end{aligned}$$

$\square$

Question 287-3.
Solution.