

Complex Variables Assignment Section 68

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Show that

$$\int \frac{\sin t}{17 + 8 \cos 2t} dt = -\frac{1}{12} \tan^{-1} \left(\frac{4}{3} \cos t \right) + C$$

and

$$\int \frac{\cos t}{17 + 8 \cos 2t} dt = \frac{1}{40} \ln |5 + 4 \sin t| - \frac{1}{40} \ln |5 - 4 \sin t| + C$$

1 Problem 1

$$\begin{aligned} \int \frac{\sin t}{17 + 8 \cos 2t} dt &= \int \frac{\sin t}{25 - 16 \sin^2 t} dt && \text{(Double-angle formula)} \\ &= \frac{1}{8} \int \frac{1}{5 - 4 \sin t} dt - \frac{1}{8} \int \frac{1}{5 + 4 \sin t} dt \\ &= \frac{1}{32} \int \frac{1}{5/4 - \sin t} dt - \frac{1}{32} \int \frac{1}{5/4 + \sin t} dt \end{aligned}$$

2 Problem 2