Plex
MAA4402 2838

Class-Prac-C

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Abbrevs. Let ***SCC*** mean "positively oriented simple-closed-contour". For a SCC C, have $\mathring{\mathsf{C}}$ be the (open) region C encloses, and let $\widehat{\mathsf{C}}$ mean C together with $\mathring{\mathsf{C}}$. So $\widehat{\mathsf{C}}$ is $\mathsf{C} \cup \mathring{\mathsf{C}}$; it is automatically simply-connected and is a closed bounded set.

Use P.V. for "principal value", and Log() for P.V of logarithm. Use ln() for natural logarithm.

Let U be SCC $\mathrm{Sph}_1(0)$, a circle of radius 1.

Prac-C1: Short answer. Show no work.

Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

a $\displaystyle\int_{-\infty}^{\infty} \frac{1}{[x^2+1]^2}\,\mathrm{d}x =$ ______________________.

b Compute $\displaystyle\int_0^{2\pi} \frac{1}{2+\sin(\theta)}\,\mathrm{d}\theta =$ ______________________.

[*Hint:* CoV $z = \mathrm{e}^{i\theta}$ works.]

c State (but do not prove) MaxMP thm: ______________

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Prac-C2: Prove: THM *Suppose $f: D \to \mathbb{C}$ is holomorphic on path-connected open D. If $|f|$ is constant on D, then f is constant on D.*

Prac-C3: i Carefully state the Cauchy Inequality thm.

ii Prove Cauchy's Inequality directly from GCIF.

Prac-C4: α State the Gauss Mean value thm.

β Derive Gauss-MVT directly from CIF.