Plex MAA4402 2838	**Class-Prac**	Prof. JLF King 01Feb2017

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.

Prac1: Short answer. Show no work.
Write **DNE** in a blank <u>if</u> the described object does not exist or if the indicated operation cannot be performed.

__ __ a Let C be radius=5 SCC $\text{Sph}_5(\boldsymbol{i})$. Then
$\displaystyle\int_C \frac{z}{z^2+1}\,\mathrm{d}z =$ ....

__ __ b The ***Laplacian*** of a twice-differentiable fnc $h\colon\mathbb{R}\times\mathbb{R}\to\mathbb{R}$, is ....

__ __ c A subset $E \subset \mathbb{C}$ is ***simply-connected*** if ....
....

Prac2: Prove that all zeros of the complex sin() fnc lie on the real axis.

Prac3: Consider a domain $D \subset \mathbb{C}$ and a fnc $h\colon D\to\mathbb{C}$ satisfying: *Every closed contour* $C \subset D$ *has* $\int_C h(z)\,\mathrm{d}z = 0$. Prove that h is (complex) differentiable.

Prac4: i State the Cauchy Integral Formula [CIF].

ii Derive the CIF using the Cauchy-Goursat thm.

Prac5: State the *Generalized* Cauchy Integral Formula.