Plex MAA4402 2838 | **Class-C** | Prof. JLF King 29Mar2017

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

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.

z The person who completed the proof that $\oint_C f = 0$, when f holomorphic on $\widehat{C}$, was: **Archimedes Argand Abel Euler Gauss Goursat Hadamard Hypatia Lagrange Liouville Morera Picard RouchÃ© Taylor Weierstrass Zeno**

a Compute $\displaystyle\int_0^{2\pi} \frac{1}{\cos(\theta)+6}\,d\theta =$ ____________.

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

b $\displaystyle\int_{-\infty}^{\infty} \frac{1}{[x^2+1]^2}\,dx =$ ____________.

[*Hint:* A ⌓ contour.]

c $\displaystyle\int_{-\infty}^{\infty} \frac{\cos(x)}{x^2+9}\,dx =$ ____________.

[*Hint:* A ⌓ contour. Sine is an odd fnc, so $\int_{-\infty}^{\infty} \frac{\sin(x)}{x^2+9}\,dx$ is zero.]

d $\displaystyle\text{Res}\left(\frac{e^{2z}}{[z-5]^4},\ z{=}5\right) =$ ____________.

e $\text{Res}\left(z^4 \cdot e^{1/z},\ z{=}0\right) =$ ____________.

OYOP: *In grammatical English **sentences**, write your essay on every **third** line* (usually)*, so that I can easily write between the lines.*

C2: i Carefully state, but DNP [Do Not Prove] Cauchy's Inequality theorem.

ii Define: A function f is ***entire*** if....

Carefully state, but DNP, Liouville's thm on entire fncs.

iii State the Gauss Mean Value Thm.

iv Derive Gauss-MVT directly from the Cauchy Integal Formula.

End of Class-C

C1:	___ ___ ___	175pts
C2:	___ ___	90pts
Total:	___ ___ ___	265pts