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

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.

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 $\oint_{\mathsf{C}} f = 0$, when f holomorphic on $\widehat{\mathsf{C}}$, was: **Archimedes Argand Abel Euler Gauss Goursat Hadamard Hypatia Lagrange Liouville Morera Picard Rouché Taylor Weierstrass Zeno**

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

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

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

[*Hint:* A ⌓ contour.]

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

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

d $\displaystyle\mathrm{Res}\Big(\frac{\mathrm{e}^{2z}}{[z-5]^4},\ z{=}5\Big) =$ ______.

e $\mathrm{Res}\Big(z^4 \cdot \mathrm{e}^{1/z},\ z{=}0\Big) =$ ______.

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