Ord: ___ ___

Plex
MAA4402 2838

Class-C

Prof. JLF King
Wedn, 12Apr2023

Folks: For short-answer: Write **DNE** if the object does not exist or the operation cannot be performed. NB: **DNE** $\neq \{\} \neq 0$.

C1: Short answer. Show no work.

___ z ∃*Math Festival* this **Sunday, 16Apr,** 10AM–1PM, in the *Rion Ballroom* of Reitz Union, open to all.
Circle: **True!** **Yes!** *What's* "Math"?

___ a In ball $\mathrm{Bal}_1(0)$, there are ⌞.....⌟ solutions to

$$2z^9 - z^6 - 7z^3 + z \;=\; 2\,.$$ [*Hint:* Rouché's thm.]

___ b For posreal N, compute

$$J_N \;:=\; \int_0^\infty \frac{\sqrt{x}}{x^2+N}\,\mathrm{d}x \;=\; .\;\text{⌞.....⌟}\;.$$

[Suggestion: **Bump contour.** (Keyhole also works, but is longer.)]

___ c Let $h(z) := \dfrac{\exp(5z)}{\sin(3z)}$. So $\mathrm{Res}(h, \boldsymbol{\pi})=$ ⌞.....⌟.

___ d Gamma fnc: $\boldsymbol{\Gamma}(7)=$ ⌞.....⌟ and $\boldsymbol{\Gamma}(\frac{7}{2})=$ ⌞.....⌟
For all real $x > 1$, our $\boldsymbol{\Gamma}()$ function satisfies recurrence relation $\boldsymbol{\Gamma}(x) =$ ⌞.....⌟.

___ e On annulus $\{2 < |z| < \infty\}$, fnc $f(z) := 1/[z - 2\mathbf{i}]$ has Laurent series $\sum_{n=-\infty}^{\infty} B_n z^n$, where $B_{-4} =$ ⌞.....⌟, $B_{-3} =$ ⌞.....⌟, and $B_2 =$ ⌞.....⌟.

C2: "*On subset* $U \subset \mathbb{C}$, *functions* $f_n{:}U{\to}\mathbb{C}$ ***converge uniformly*** *to* $g{:}U{\to}\mathbb{C}$" means [the formal, ε defn]:
⌞.....⌟
⌞.....⌟
⌞.....⌟
⌞.....⌟
⌞.....⌟.

C1:	___ ___ ___	165pts
C2:	___ ___	45pts
Total:	___ ___ ___	210pts

NAME: ⌞.....⌟

HONOR CODE: *"I have neither requested nor received help on this exam other than from my professor."*

Signature: ⌞.....⌟