Panel 1

Complex Analysis - HW 23

① State the following theorems (in fact, put them on flashcards and memorize them).

- Thm about $\int_\gamma f(z)dz$ and antiderivatives
- Cauchy-Goursat thm
- Deformation thm
- Cauchy Integral Formula

Private Freehand 1

Panel 2

(2) Use whichever thm applies to evaluate:

a) $\int_\gamma 3z^2 + z - 1 \, dz$, γ a line from $1-i$ to $3+2i$

b) $\int_\gamma \cos(z^2) e^{z^3} \, dz$, γ circle centered at 0, radius 3

c) $\int_\gamma \frac{e^{z^2}}{z-3} \, dz$, γ circle centered at 0, radius 1

d) $\int_\gamma \frac{e^{z^2}}{z-1} \, dz$, γ circle centered at 0, radius 3

Private Freehand 2

Panel 3

e) $\int_\gamma \frac{z+1}{(z-2)(z-4)}\,dz$ for

i) γ a circle, center at 0, radius 1

ii) γ a circle, center at 0, radius 3

iii) γ a circle, center at 0, radius 5

f) $\int_\gamma \frac{z+1}{z}\,dz$, γ circle, center 0, radius 2

i) using the def-function and parameterization $z(t) = e^{it}$, $t \in [0, 2\pi]$

ii) using the Cauchy Integral Formula

Private Freehand 3

Panel 4

g) $\int_\gamma \bar{z}^2\,dz$, γ a closed triangle through $(-1,-1)$, $(1,-1)$, $(0,1)$

(3) In which case does it make sense to write $\int_a^b f(x)\,dx$ instead of $\int_\gamma f(x)\,dz$, where γ is a curve from a to 5:

a) $\int_a^5 z^2 + 2z - 1\,dz$

b) $\int_a^b (\bar{z})^2 + 2\bar{z} - 1\,dz$

Private Freehand 4