

PMAT 421      WINTER 08  
Assignment #4      Due by Friday April 11, 4pm

I.D.#

NAME:

1. Find the residue at  $z = -1$  of  $f(z) = \frac{z^{12}}{(z+1)^{10}}$ . [5]
2. Evaluate  $\int_c \frac{\text{Log } z}{\sin(z-1)} dz$  where  $c$  is the circle  $|z-3| = 2.5$  oriented positively. [7]
3. Find the residue at  $z = 0$  of  $f(z) = z^3 \cos \frac{2}{z}$ . [5]
4. Find all singular points and then the residues of  $f(z) = \frac{1}{e^{2z} + e^z(1-i) - i}$ . [7]
5. Evaluate  $\int_c \frac{z}{e^z + e^{-z}} dz$  where  $c$  is the circle  $|z-2i| = 3$ , positively oriented. [6]
6. Evaluate  $\int_{-1}^1 z^i dz$  using the branch with  $\arg z \in \left(\frac{\pi}{2}, \frac{3}{2}\pi\right)$ . [5]
7. Classify all singular points of  $f(z) = \frac{1}{e^{z^2} - 1}$  and then find all residues. [8]
8. Evaluate  $\int_0^\infty \frac{x^2 + 1}{x^4 + 1} dx$ . Explain all steps. [7]

**TOTAL out of 50:**