

HOMEWORK 6, DUE FRIDAY, MARCH 14

Please turn in solutions for the following problems:

(1) Compute each of the following contour integrals:

(a)  $\int_C e^z dz$ , where  $C$  is the line segment from 0 to  $1 + i$

(b)  $\int_C \frac{1}{z+4} dz$ , where  $C$  is the circle of radius 1 centered at  $-4$  traversed counterclockwise

(c)  $\int_C z dz$ , where  $C$  is the left semicircle from  $i$  to  $-i$

(d)  $\int_C z\bar{z} dz$ , where  $C$  is the line segment from  $-1 + i$  to  $1 + 5i$

(e)  $\int_C z^3 - 6z^2 + 4 dz$ , where  $C$  is any curve joining  $-1 + i$  to  $1$

(2) Suppose  $f(z)$  is the principal branch of  $z^i$ . That is,  $f(z) = e^{i \operatorname{Log}(z)}$ , for  $-\pi < \operatorname{Arg}(z) < \pi$ . Let  $C$  be the upper semicircle parametrized by  $z(t) = e^{it}$ , for  $0 \leq t \leq \pi$ . Compute the integral  $\int_C f(z) dz$ .

In addition, I suggest that you work these problems from the Brown/Churchill textbook (but do not turn in):

- Page 135, problems 1, 2, 4, 6
- Page 149, problems 1, 2