## Homework 8 Due: Friday, October 19

1. If *f* is a function, and  $S = z_1, \dots, z_n$  is a finite set of complex numbers, then the average value of *f* on *S* is

$$\langle f(z) \rangle_S = \frac{1}{n} \sum_{j=1}^n f(z_j).$$

Fix a number  $n \ge 2$  and a nonzero number  $\alpha$ . Let *S* be the set of  $n^{th}$  roots of  $\alpha$ .

- (a) What is  $\langle z \rangle_S$ ? (HINT: See problem 2b on the midterm.)
- (b) Suppose  $1 \le m < n$ . What is  $\langle z^m \rangle_S$ ?
- (c) Suppose m = 0. What is  $\langle z^m \rangle_S$ ?
- (d) Let P(z) be a polynomial of degree deg P < n. Prove that

$$\langle P(z) \rangle_S = P(0).$$

2. [BC]37.1.

- 3. [BC]37.3, 40.7.
- 4. (a) [BC] 40.2.
  - (b) Repeat problem (a) using the function  $g(z) = \overline{z} 1$ .

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