

PROJECT III - MATH 800
DUE APRIL 4, 2019

- (1) Problem 2/page 145;
- (2) Problem 5 b), c), f) /page 145;
- (3) Problem 8 a)/page 146;

Hint: Consider $g(z) = f(z)(z - P)$, defined for $D(P, r) \setminus \{P\}$. Write its Taylor series (why does it exist?) and argue from there.

- (4) Problem 9/page 146;

Hint: Show first that what they ask follows from: If f has essential singularity at P , then for every n

$$\limsup_{z \rightarrow P} |(z - P)^n f(z)| = \infty.$$

Then, work to show this last formulation by contradiction.

- (5) Problem 13 b), c), e)/page 147;
- (6) Problem 14/page 147;

Hint: Answer is no. Try the sequence of partial sums of a Laurent series at an essential singularity like $e^{1/z}$. **Hint:** Argue by looking at the Laurent expansion.

- (7) Problem 38/page 152.
- (8) 47/page 154
- (9) 51/page 154
- (10) 54/page 154.