Supplementary Problems # 3

1. **Page 79**: # 3, 11, 12(a), 13(a), 17, 20.

2. **Page 86**: # 1, 5, 11, 12.

3. **Page 93**: # 1(a), 5, 7.

4. Let \( f(z) = (z^2 - 1)^{1/2} \). Describe the set where \( f \) is analytic if the following branches are chosen:
   - (a) \( f(z) = (z^2 - 1)^{1/2} = e^{\frac{i}{2} \text{Log}(z^2 - 1)} \)
   - (b) \( f(z) = (z^2 - 1)^{1/2} = ze^{\frac{i}{2} \text{Log}(1 - \frac{1}{z^2})} \)

5. Where is the single-valued function \( g(z) = \mathcal{L}_0(z^2 + 9) \) analytic?

6. **Page 93**: # 15(c).

7. Show that if \( n \) is any positive integer \((n = 1, 2, \ldots, 20)\), then
   \[
   \log \left( z^{\frac{1}{n}} \right) = \frac{1}{n} \log z.
   \]

8. Sketch the level curves for the real and imaginary parts of the analytic function
   \[
   f(z) = \text{Log}(z - 1) - \text{Log}(z + 1).
   \]