<div align="center">

Math 5680

Homework # 6

Applications of the residue theorem

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1. Evaluate the integral $\displaystyle\int_0^{2\pi} \frac{d\theta}{2 - \sin(\theta)}$

2. Evaluate the integral $\displaystyle\int_0^{2\pi} \frac{\cos(3\theta)}{5 - 4\cos(\theta)}\, d\theta$

   [Hint: You might need Mathematica or Wolfram Alpha to calculate a second derivative at one point in the derivation.]

3. Evaluate the integral $\displaystyle\int_0^{\infty} \frac{dx}{1 + x^6}\, dx$

4. Evaluate the integral $\displaystyle\int_0^{\infty} \frac{1 + x^2}{1 + x^4}\, dx$

5. Evaluate the integral $\displaystyle\int_{-\infty}^{\infty} \frac{x \sin(x)}{x^4 + 1}\, dx$