

MATH 206 HOMEWORK 5

Due date 6 May 2008

1. Evaluate the integrals below using MATLAB

a. $\int_0^{\infty} \frac{x^2 dx}{(x^2 + 1)(x^2 + 4)}$

b. $\int_0^{\infty} \frac{dx}{(x^4 + 1)}$

c. $\int_0^{\infty} \frac{x dx}{(x^4 + 3)^2}$

(integral limits are from 0 to infinity)

2. Find the poles and the corresponding residues of the functions below:

a. $1/(z^2 + 2iz + 3)$

b. $(z+1)/(z^2 - 2z + 2)$

3. Use MATLAB to determine how many roots $e^z - 2z = 0$ has inside the circle $|z| = 3$ by plotting the image of this circle under $w = e^z - 2z$.

4. Use MATLAB to find the number of roots of $z^4 + z^3 + 1 = 0$ between the circles $|z| = 3/4$ (inclusive) and $|z| = 3/2$. Verify using the command "roots".