

MTH 317/617  
Homework #10

Due Date: December 8, 2023

## 1 Problems for Everyone

1. Evaluate the following integrals using contour integration. You must show and justify your steps to receive full credit.

(a)  $\int_{-\infty}^{\infty} \frac{x^4}{1+x^8} dx.$

(b)  $\int_{-\infty}^{\infty} \frac{x^2}{x^4 - 4x^2 + 5}.$

(c)  $\int_{-\infty}^{\infty} \frac{1}{(x^2 + a^2)(x^2 + b^2)} dx,$  where  $a > b > 0.$

(d)  $\int_{-\infty}^{\infty} \frac{\cos(x)}{(x^2 + 1)(x^2 + 4)} dx$

(e)  $\int_{-\infty}^{\infty} \frac{x \sin(x)}{x^4 + 1} dx$

(f)  $\int_{-\infty}^{\infty} \frac{\sin(x)}{x^2 + 6x + 10} dx$

(g)  $\int_{-\infty}^{\infty} \frac{\cos(x)}{(x+a)^2 + b^2},$  where  $a, b \in \mathbb{R}.$