

## Math 417 Homework 10

Due November 20

1. Determine  $\int_{-\infty}^{\infty} \frac{x^3 \sin(2x)}{x^4+16} dx$ .
2. Determine  $\int_0^{\infty} \frac{(\ln x)^2}{x^2+4} dx$ . You may use that  $\int_0^{\infty} \frac{1}{x^2+4} dx = \frac{\pi}{4}$ .
3. Determine  $\int_0^{2\pi} \frac{d\theta}{4+3 \cos \theta}$ .
4. Show that for any  $a, b \geq 0$ ,  $\int_0^{\infty} \frac{\cos(ax) - \cos(bx)}{x^2} dx = \frac{\pi}{2}(b - a)$ .
5. For any  $-1 < c < 1$ , determine  $\int_0^{\infty} \frac{x^c}{x^2+4} dx$ .