MAT334, COMPLEX VARIABLES, SUMMER 2020. PROBLEMS FOR JULY 20 − 31

Due Saturday, August 1, at 10:00 PM EDT.

1. Consider the integral from question 2 of the previous homework assignment:

$$\int_{-\infty}^{+\infty} \frac{\sin mx}{x(x^2 + a^2)} \, dx,$$

and assume that both m and a are positive real numbers. By using an indented contour, evaluate this integral fully. [You are allowed to resubmit material submitted as part of the previous assignment if you wish.]

2. Evaluate the following integral:

$$\int_0^{2\pi} \frac{dt}{(c - \cos 2t)^2},$$

where c is a real number with absolute value greater than 1.

3. Choose *one* of the following integrals, and evaluate it:

$$\int_0^\infty \frac{\cos x^2 - \sin x^2}{x^8 + 1} \, dx, \qquad \int_0^\infty \frac{x^{1/2}}{x^2 + 1}.$$

You are strongly encouraged to also do the other integral for practice! [Hint for the first integral: try evaluating $\int_0^\infty \frac{e^{ix^2}}{x^8+1} \, dx$.]