MATH 417 HOMEWORK 10

This homework is due Wednesday November 12 in the beginning of class. You may collaborate on the homework. However, the final write-up must be yours and should reflect your own understanding of the problem. Please be sure to properly cite any help you get.

Problem 1 Calculate the following integral. In order to receive credit you must show all your reasoning.
$$\int_0^\infty \frac{dx}{x^2 + 1}$$

Problem 2 Calculate the following integral. In order to receive credit you must show all your reasoning.
$$\int_0^\infty \frac{dx}{(x^2 + 1)^2}.$$

Problem 3 Let $a > 0, b > 0$. Calculate the following integral. In order to receive credit you must show all your reasoning.
$$\int_0^\infty \frac{\cos(ax)}{(x^2 + b^2)^2}.$$

Problem 4 Let $a > 0$. Calculate the following integral. In order to receive credit you must show all your reasoning.
$$\int_{-\infty}^\infty \frac{x^3 \sin(ax)}{x^4 + 4} dx.$$

Problem 5 Let $-1 < a < 3$. Calculate the following integral. In order to receive credit you must show all your reasoning.
$$\int_0^\infty \frac{x^a}{(x^2 + 1)^2} dx.$$

Note that here $x^a = e^{a \ln x}$