

Physics 751 Homework #6

Due Friday October 10

1. Evaluate the integral $\int_{-\infty}^{\infty} \frac{dx}{x^2 + a^2}$, a real, by closing the contour with a large semicircle at infinity—and prove that the semicircle gives a zero contribution.

2. Evaluate the integral $\int_{-\infty}^{\infty} \frac{e^{ikx}}{x - x_0 + i\varepsilon} dx$ by closing with a large semicircle at infinity (upper half plane or lower half plane?). Here ε is a very small real quantity, as usual. Does the value of the integral depend on the *sign* of ε ? What about the sign of k ? (k is real.) Explain.

Shankar 5.4.2, 5.4.3.