$$\int_0^\infty \frac{4\pi}{3i\pi} \frac{ax^2}{(x^2 - a^2)^2} \, \mathrm{d}x = \begin{cases} \frac{\pi}{3} & \text{for } |2\arg(a) - \pi| < \pi \\ -\frac{4ia \int_0^\infty \frac{x^2}{(a^2 - x^2)^2} \, dx}{3} & \text{otherwise} \end{cases} \tag{1}$$