

PROOF OF FORMULA 4.234.8

$$\int_0^{\infty} \frac{x^2 \ln x dx}{(a^2 + b^2 x^2)(1 + x^2)} = \frac{\pi a}{2b(b^2 - a^2)} \ln \frac{b}{a}$$

The change of variables $t = 1/x$ yields

$$\int_0^{\infty} \frac{x^2 \ln x dx}{(a^2 + b^2 x^2)(1 + x^2)} = - \int_0^{\infty} \frac{\ln t dt}{(b^2 + a^2 t^2)(1 + t^2)}.$$

This is entry 4.234.6 with a and b interchanged.