

PROOF OF FORMULA 3.472.2

$$\int_0^{\infty} x^2 \exp\left(-\frac{a}{x^2} - bx^2\right) dx = \frac{\sqrt{\pi}(1 + 2\sqrt{ab})}{4b\sqrt{b}} e^{-2\sqrt{ab}}$$

Formula 3.325 states that

$$\int_0^{\infty} \exp\left(-\frac{a}{x^2} - bx^2\right) dx = \frac{\sqrt{\pi}}{2\sqrt{b}} e^{-2\sqrt{ab}}.$$

Differentiate with respect to b to obtain the current evaluation.