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$$f_Y(y)$$

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Now inserting into the formula page 304 we get

$$f_Y(y) = \frac{1}{\pi}\frac{1}{1+y^2}, -\infty < y < \infty$$

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The function is symmetric ($f_Y(y)$

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The integral $\int_{-\infty}^{\infty} y f_Y(y)\mathrm{d}y$ has to converge absolutely for $E(Y)$ to exist, i.e. $E(Y)$ exists if and only if $E(|Y|)$ exists (e.g. page 263 bottom).