C4282

! For an efficient use of these tables, first read `HowTo.pdf`.

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T3.18A. Integrands of the form $\dfrac{1}{x^2}\sqrt{\dfrac{a^2 \pm x^2}{b^2 \pm x^2}}$ on the interval (y, ∞).

Notation used: $\beta = \arctan\dfrac{\alpha}{y}, \quad \xi = \arcsin\sqrt{\dfrac{a^2+b^2}{a^2+y^2}}, \quad \nu = \arcsin\dfrac{a}{y},$

$$q = \frac{\sqrt{a^2-b^2}}{a}, \quad r = \frac{b}{\sqrt{a^2+b^2}}, \quad t = \frac{b}{a}.$$

1. $\displaystyle\int_y^\infty \frac{dx}{x^2}\sqrt{\frac{a^2+x^2}{x^2-b^2}} = \frac{\sqrt{a^2+b^2}}{b^2}E(\xi,\, s) - \frac{a^2}{b^2 y}\sqrt{\frac{y^2-b^2}{a^2+y^2}}, \quad y \ge b > 0.$

2. $\displaystyle\int_y^\infty \frac{dx}{x^2}\sqrt{\frac{x^2+a^2}{x^2+b^2}} = \frac{1}{a}F(\beta,\, q) - \frac{a}{b^2}E(\beta,\, q) + \frac{a^2}{b^2 y}\sqrt{\frac{b^2+y^2}{a^2+y^2}}, \quad a > b,\ y > 0.$

3. $\displaystyle\int_y^\infty \frac{dx}{x^2}\sqrt{\frac{x^2+b^2}{x^2+a^2}} = \frac{1}{a}\left\{F(\beta,\, q) - E(\beta,\, q)\right\} + \frac{1}{y}\sqrt{\frac{b^2+y^2}{a^2+y^2}}, \quad a > b,\ y > 0.$

4. $\displaystyle\int_y^\infty \frac{dx}{x^2}\sqrt{\frac{x^2-b^2}{a^2+x^2}} = \frac{\sqrt{a^2+b^2}}{a^2}\left\{F(\xi,\, s) - E(\xi,\, s)\right\} + \frac{1}{y}\sqrt{\frac{y^2-b^2}{a^2+y^2}}, \quad y \ge b > 0.$

5. $\displaystyle\int_y^\infty \frac{dx}{x^2}\sqrt{\frac{x^2-a^2}{x^2-b^2}} = \frac{a}{b^2}E(\nu,\, t) - \frac{a^2-b^2}{ab^2}F(\nu,\, t), \quad y \ge a > b > 0.$

6. $\displaystyle\int_y^\infty \frac{dx}{x^2}\sqrt{\frac{x^2-b^2}{x^2-a^2}} = \frac{1}{a}E(\nu,\, t), \quad y \ge a > b > 0.$

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