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

T3.12A. Integrands of the form $\dfrac{x^n}{\sqrt{(a^2 \pm x^2)^3\,(b^2 \pm x^2)}}$ and $\dfrac{x^n}{\sqrt{(a^2 \pm x^2)\,(b^2 \pm x^2)^3}}$ for $n = 0, 2$, on the intervals (y, ∞).

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

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

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

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

3. $$\int_y^\infty \frac{dx}{\sqrt{(a^2+x^2)^3(x^2-b^2)}} = \frac{1}{a^2\sqrt{a^2+b^2}}\{F(\xi,\,s) - E(\xi,\,s)\}, \quad y \ge b > 0.$$

4. $$\int_y^\infty \frac{dx}{\sqrt{(a^2+x^2)(x^2-b^2)^3}} = \frac{y}{b^2\sqrt{(a^2+y^2)(y^2-b^2)}} - \frac{1}{b^2\sqrt{a^2+b^2}}E(\xi,\,s), \quad y \ge b > 0.$$

5. $$\int_y^\infty \frac{dx}{\sqrt{(x^2-a^2)^3(x^2-b^2)}} = \frac{1}{a(b^2-a^2)}\left\{E(\nu,\,t) - \frac{a}{y}\sqrt{\frac{y^2-b^2}{y^2-a^2}}\right\}, \quad y > a > b > 0.$$

6. $$\int_y^\infty \frac{dx}{\sqrt{(x^2-a^2)(x^2-b^2)^3}} = \frac{1}{b^2(a^2-b^2)}\left\{aE(\nu,\,t) - \frac{b^2}{y}\sqrt{\frac{y^2-a^2}{y^2-b^2}}\right\}$$

$$-\frac{1}{ab^2}F(\nu,\,t),\quad y\ge a>b>0.$$

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

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

9. $$\int_y^\infty \frac{x^2\,dx}{\sqrt{(a^2+x^2)^3(x^2-b^2)}}=\frac{1}{\sqrt{a^2+b^2}}E(\xi,s),\quad y\ge b>0.$$

10. $$\int_y^\infty \frac{x^2\,dx}{\sqrt{(a^2+x^2)(x^2-b^2)^3}}=\frac{1}{\sqrt{a^2+b^2}}\{F(\xi,\,s)-E(\xi,\,s)\}+\frac{y}{\sqrt{(a^2+y^2)(y^2-b^2)}},\quad y>b>0.$$

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

12. $$\int_y^\infty \frac{x^2\,dx}{\sqrt{(x^2-a^2)(x^2-b^2)^3}}=\frac{1}{a^2-b^2}\left\{aE(\nu,\,t)-\frac{b^2}{y}\sqrt{\frac{y^2-a^2}{y^2-b^2}}\right\},\quad y\ge a>b>0.$$