9.2 Integrals of Rational Functions

876. $\int a\,dx = ax + C$

877. $\int x\,dx = \frac{x^2}{2} + C$

878. $\int x^2\,dx = \frac{x^3}{3} + C$

879. $\int x^p\,dx = \frac{x^{p+1}}{p+1} + C,\ p \neq -1.$

880. $\int (ax+b)^n\,dx = \frac{(ax+b)^{n+1}}{a(n+1)} + C,\ n \neq -1.$

881. $\int \frac{dx}{x} = \ln|x| + C$

882. $\int \frac{dx}{ax+b} = \frac{1}{a}\ln|ax+b| + C$

883. $\int \frac{ax+b}{cx+d}\,dx = \frac{a}{c}x + \frac{bc-ad}{c^2}\ln|cx+d| + C$

884. $\int \frac{dx}{(x+a)(x+b)} = \frac{1}{a-b}\ln\left|\frac{x+b}{x+a}\right| + C,\ a \neq b.$

885. $\int \frac{x\,dx}{a+bx} = \frac{1}{b^2}\left(a + bx - a\ln|a+bx|\right) + C$

886. $\int \frac{x^2\,dx}{a+bx} = \frac{1}{b^3}\left[\frac{1}{2}(a+bx)^2 - 2a(a+bx) + a^2\ln|a+bx|\right] + C$

887. $\int \frac{dx}{x(a+bx)} = \frac{1}{a}\ln\left|\frac{a+bx}{x}\right| + C$

888. $\int \frac{dx}{x^2(a+bx)} = -\frac{1}{ax} + \frac{b}{a^2}\ln\left|\frac{a+bx}{x}\right| + C$

889. $\int \frac{x\,dx}{(a+bx)^2} = \frac{1}{b^2}\left(\ln|a+bx| + \frac{a}{a+bx}\right) + C$

890. $$\int \frac{x^2 dx}{(a+bx)^2} = \frac{1}{b^3}\left(a+bx-2a\ln|a+bx|-\frac{a^2}{a+bx}\right)+C$$

891. $$\int \frac{dx}{x(a+bx)^2} = \frac{1}{a(a+bx)}+\frac{1}{a^2}\ln\left|\frac{a+bx}{x}\right|+C$$

892. $$\int \frac{dx}{x^2-1} = \frac{1}{2}\ln\left|\frac{x-1}{x+1}\right|+C$$

893. $$\int \frac{dx}{1-x^2} = \frac{1}{2}\ln\left|\frac{1+x}{1-x}\right|+C$$

894. $$\int \frac{dx}{a^2-x^2} = \frac{1}{2a}\ln\left|\frac{a+x}{a-x}\right|+C$$

895. $$\int \frac{dx}{x^2-a^2} = \frac{1}{2a}\ln\left|\frac{x-a}{x+a}\right|+C$$

896. $$\int \frac{dx}{1+x^2} = \tan^{-1}x+C$$

897. $$\int \frac{dx}{a^2+x^2} = \frac{1}{a}\tan^{-1}\frac{x}{a}+C$$

898. $$\int \frac{xdx}{x^2+a^2} = \frac{1}{2}\ln\left(x^2+a^2\right)+C$$

899. $$\int \frac{dx}{a+bx^2} = \frac{1}{\sqrt{ab}}\arctan\left(x\sqrt{\frac{b}{a}}\right)+C,\ ab>0.$$

900. $$\int \frac{x\,dx}{a+bx^2} = \frac{1}{2b}\ln\left|x^2+\frac{a}{b}\right| + C$$

901. $$\int \frac{dx}{x\left(a+bx^2\right)} = \frac{1}{2a}\ln\left|\frac{x^2}{a+bx^2}\right| + C$$

902. $$\int \frac{dx}{a^2-b^2x^2} = \frac{1}{2ab}\ln\left|\frac{a+bx}{a-bx}\right| + C$$

903. $$\int \frac{dx}{ax^2+bx+c} = \frac{1}{\sqrt{b^2-4ac}}\ln\left|\frac{2ax+b-\sqrt{b^2-4ac}}{2ax+b+\sqrt{b^2-4ac}}\right| + C,$$

$b^2-4ac>0$.

904. $$\int \frac{dx}{ax^2+bx+c} = \frac{2}{\sqrt{4ac-b^2}}\arctan\frac{2ax+b}{\sqrt{4ac-b^2}} + C,$$

$b^2-4ac<0$.