

# Math Formulas: Definite integrals of rational functions

1. 
$$\int_0^{\infty} \frac{dx}{x^2 + a^2} = \frac{\pi}{2a}$$
2. 
$$\int_0^{\infty} \frac{x^{p-1} dx}{1+x} = \frac{\pi}{\sin(p\pi)}, \quad 0 < p < 1$$
3. 
$$\int_0^{\infty} \frac{x^m}{x^n + a^n} = \frac{\pi a^{m+1-n}}{n \sin[(m+1)\pi/n]}, \quad 0 < m+1 < n$$
4. 
$$\int_0^a \frac{dx}{\sqrt{a^2 - x^2}} = \frac{\pi}{2}$$
5. 
$$\int_0^a \sqrt{a^2 - x^2} dx = \frac{\pi a^2}{4}$$
6. 
$$\int_0^a x^m (a^n - x^n)^p dx = \frac{a^{m+1+np} \Gamma[(m+1)/n] \Gamma(p+1)}{n \Gamma[(m+1)/n + p + 1]}$$