# **Numerical Integration**

# **Definition**: Numerical integration, also known as numerical quadrature, is a technique used to approximate the definite integral of a function over a given interval. The main idea is to divide the interval into smaller subintervals and approximate the integrNumerical integration, also known as numerical quadrature, is a technique used to approximate the definite intNumerical integration, also known as numerical quadrature, is a technique used to approximate the definite integral of a function over a given interval. The main idea is to divide the interval into smaller subintervals and approximate the integral by summing up the areas of simpler shapes, like rectangles or trapezoids, that closely approximate the function within those subintervals.

Methods to Solve Numerical Integration:

1. Trapezoidal Rule

2. Simpson's Rule

3. Midpoint Rule

4. Riemann Sum

5. Monte Carlo Integration

6. Gaussian Quadrature

7. Romberg Integration

[Numerical integration is the **approximate computation of an integral using numerical techniques**](https://www.bing.com/ck/a?!&&p=4387199183922fc7JmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTYyNA&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9tYXRod29ybGQud29sZnJhbS5jb20vTnVtZXJpY2FsSW50ZWdyYXRpb24uaHRtbA&ntb=1)[**1**](https://www.bing.com/ck/a?!&&p=ae0c90c7eace894fJmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTYyNQ&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9tYXRod29ybGQud29sZnJhbS5jb20vTnVtZXJpY2FsSW50ZWdyYXRpb24uaHRtbA&ntb=1). [It is sometimes called quadrature](https://www.bing.com/ck/a?!&&p=7b44ea94e65f591aJmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTYyNg&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9tYXRod29ybGQud29sZnJhbS5jb20vTnVtZXJpY2FsSW50ZWdyYXRpb24uaHRtbA&ntb=1)[**1**](https://www.bing.com/ck/a?!&&p=9f01a2e50194f40bJmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTYyNw&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9tYXRod29ybGQud29sZnJhbS5jb20vTnVtZXJpY2FsSW50ZWdyYXRpb24uaHRtbA&ntb=1). [Numerical integration comprises a broad family of algorithms for calculating the numerical value of a definite integral](https://www.bing.com/ck/a?!&&p=36596b1a982aa496JmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTYyOA&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9lbi53aWtpcGVkaWEub3JnL3dpa2kvTnVtZXJpY2FsX2ludGVncmF0aW9u&ntb=1)[**2**](https://www.bing.com/ck/a?!&&p=4af3500068f78512JmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTYyOQ&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9lbi53aWtpcGVkaWEub3JnL3dpa2kvTnVtZXJpY2FsX2ludGVncmF0aW9u&ntb=1). [The term is also sometimes used to describe the numerical solution of differential equations](https://www.bing.com/ck/a?!&&p=09e01ea55d0e4ca7JmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTYzMA&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9lbi53aWtpcGVkaWEub3JnL3dpa2kvTnVtZXJpY2FsX2ludGVncmF0aW9u&ntb=1)[**2**](https://www.bing.com/ck/a?!&&p=fd336c7468bfd4adJmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTYzMQ&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9lbi53aWtpcGVkaWEub3JnL3dpa2kvTnVtZXJpY2FsX2ludGVncmF0aW9u&ntb=1).

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[**1. mathworld.wolfram.com**](https://www.bing.com/ck/a?!&&p=38a17064e8fa9656JmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTQzNw&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9tYXRod29ybGQud29sZnJhbS5jb20vTnVtZXJpY2FsSW50ZWdyYXRpb24uaHRtbA&ntb=1)[**2. wikipedia.org**](https://www.bing.com/ck/a?!&&p=f8c2cf359cba4bebJmltdHM9MTY5MDQxNjAwMCZpZ3VpZD0xZGU0OTAzNC02NTk3LTY4ODMtMGU1MS04MjljNjQ5NjY5YjImaW5zaWQ9NTQzOA&ptn=3&hsh=3&fclid=1de49034-6597-6883-0e51-829c649669b2&psq=define+numerical+intgration&u=a1aHR0cHM6Ly9lbi53aWtpcGVkaWEub3JnL3dpa2kvTnVtZXJpY2FsX2ludGVncmF0aW9u&ntb=1)