

Differential Calculus

MTH 62-140

Laws/Theorems/Definitions About Definite Integrals

1. Sum of series:

$$(a) \quad 1 + 2 + 3 + 4 + \cdots + n = \frac{n(n+1)}{2}$$

$$(b) \quad 1^2 + 2^2 + 3^2 + 4^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

$$(c) \quad 1^3 + 2^3 + 3^3 + 4^3 + \cdots + n^3 = \left(\frac{n(n+1)}{2} \right)^2$$

$$(d) \quad 1^4 + 2^4 + 3^4 + 4^4 + \cdots + n^4 = \frac{1}{5} (6n^5 + 15n^4 + 10n^3 - n)$$

$$(e) \quad \sin(x) + \sin(2x) + \sin(3x) + \cdots + \sin(nx) = \frac{\cos(\frac{x}{2}) - \cos(n + \frac{1}{2})x}{2 \sin(\frac{x}{2})}$$

$$(f) \quad \cos(x) + \cos(2x) + \cos(3x) + \cdots + \cos(nx) = \frac{\sin(n + \frac{1}{2})x - \sin(\frac{x}{2})}{2 \sin(\frac{x}{2})}$$

2. Antiderivatives

(a)

(b)

(c)