

University of Bahrain  
 Department of Mathematics  
 MATHS104: Business Mathematics II  
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## Integration Rules

### Indefinite Integral

$$\int f(x) dx = \underbrace{F(x)}_{\text{antiderivative}} + C \quad \text{--- a function}$$

### Elementary Integration Rules

$$1. \int k dx = kx + C.$$

$$2. \int x^n dx = \frac{1}{n+1} x^{n+1} + C \quad n \neq -1.$$

$$3. \int x^{-1} dx = \int \frac{1}{x} dx = \ln x + C \quad x > 0.$$

$$4. \int e^x dx = e^x + C.$$

$$\int e^{kx} dx = \frac{1}{k} e^{kx} + C.$$

$$5. \int a^x dx = \frac{1}{\ln a} a^x + C.$$

$$6. \int kf(x) dx = k \int f(x) dx.$$

$$7. \int (f(x) + g(x)) dx = \int f(x) dx + \int g(x) dx.$$

$$8. \text{ (Integration by parts) } \int u dv = uv - \int v du.$$

**Definite Integral:**

$$\int_a^b f(x) dx = \left[ \underbrace{F(x)}_{\text{antiderivative}} \right]_a^b = F(b) - F(a) \quad \text{--- a number}$$

**Average Value of a function**

$$\bar{f} = \frac{1}{b-a} \int_a^b f(x) dx$$

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