

### Basic properties of indefinite and definite integration

1.  $\int kf(x)dx = k \int f(x)dx.$
2.  $\int [f(x) + g(x)]dx = \int f(x)dx + \int g(x)dx.$
3.  $\int [f(x) - g(x)]dx = \int f(x)dx - \int g(x)dx.$
4.  $\int_a^b f(x)dx = \lim_{n \rightarrow \infty} \sum_{k=1}^n f(x_k^*)\Delta x, \text{ where } \Delta x = \frac{b-a}{n}.$
5.  $\int_a^a f(x)dx = 0.$
6.  $\int_a^b f(x)dx = - \int_b^a f(x)dx.$
7.  $\int_a^c f(x)dx = \int_a^b f(x)dx + \int_b^c f(x)dx.$

### The Fundamental Theorem of Calculus

1.  $\int_a^b f(x)dx = F(b) - F(a) = \left[ \int f(x) \right]_a^b.$
2.  $\frac{d}{dx} \left[ \int_a^x f(t)dt \right] = f(x).$

### Integrals from Calculus I

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| <ol style="list-style-type: none"> <li>1. <math>\int m dx = mx + C.</math></li> <li>2. <math>\int x^n dx = \frac{x^{n+1}}{n+1} + C \ (n \neq -1).</math></li> <li>3. <math>\int \frac{1}{x} dx = \ln x  + C.</math></li> <li>4. <math>\int e^x dx = e^x + C.</math></li> <li>5. <math>\int b^x dx = \frac{b^x}{\ln(b)} + C \ (0 &lt; b, b \neq 1).</math></li> <li>6. <math>\int \sin(x) dx = -\cos(x) + C.</math></li> <li>7. <math>\int \cos(x) dx = \sin(x) + C.</math></li> </ol> | <ol style="list-style-type: none"> <li>8. <math>\int \sec^2(x) dx = \tan(x) + C.</math></li> <li>9. <math>\int \csc^2(x) dx = -\cot(x) + C.</math></li> <li>10. <math>\int \sec(x) \tan(x) dx = \sec(x) + C.</math></li> <li>11. <math>\int \csc(x) \cot(x) dx = -\csc(x) + C.</math></li> <li>12. <math>\int \frac{1}{1+x^2} dx = \tan^{-1}(x) + C.</math></li> <li>13. <math>\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1}(x) + C.</math></li> </ol> |
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