APPENDIX 1: STANDARD INTEGRALS

1. Integral of a constant function

$$\int c\,dx = cx + C, \qquad c \in \mathbb{R}$$

2. Integral of a power function

$$\int [f(x)]^n f'(x)\,dx = \frac{1}{n+1}[f(x)]^{n+1} + C \text{ for each real number } n \neq -1$$

3. Integral of the natural exponential function

$$\int e^{f(x)} f'(x)\,dx = e^{f(x)} + C$$

4. Integral of any exponential function

$$\int a^{f(x)} f'(x)\,dx = \frac{1}{\ln a} a^{f(x)} + C, \quad a > 0$$

5. The integrals of the trigonometric functions

$$\int \sin(f(x))f'(x)\,dx = -\cos(f(x)) + C$$

$$\int \cos(f(x))f'(x)\,dx = \sin(f(x)) + C$$

$$\int \sec^2(f(x))f'(x)\,dx = \tan(f(x)) + C$$

$$\int \mathrm{cosec}(f(x))\ \cot(f(x))f'(x)\,dx = -\mathrm{cosec}(f(x)) + C$$

$$\int \sec(f(x))\ \tan(f(x))f'(x)\,dx = \sec(f(x)) + C$$

$$\int \mathrm{cosec}^2(f(x))f'(x)\,dx = -\cot(f(x)) + C$$

$$\int \sec(f(x))f'(x)\,dx = \ln|\sec(f(x)) + \tan(f(x))| + C$$

$$\int \mathrm{cosec}(f(x))\ f'(x)\,dx = \ln\left|\mathrm{cosec}(f(x)) - \cot(f(x))\right| + C$$

6. The integrals of the inverse trigonometric functions

$$\int \frac{f'(x)}{\sqrt{a^2 - [f(x)]^2}}\,dx = \arcsin\left(\frac{f(x)}{a}\right) + C$$

$$\int \frac{f'(x)}{a^2 + [f(x)]^2}\,dx = \frac{1}{a}\arctan\left(\frac{f(x)}{a}\right) + C$$

7. The integrals of logarithmic functions

$$\int \frac{f'(x)}{f(x)}\,dx = \ln|f(x)| + C$$

8. The integrals of hyperbolic functions

$$\int \sinh(f(x))f'(x)\,dx = \cosh(f(x)) + C$$

$$\int \cosh(f(x))f'(x)\,dx = \sinh(f(x)) + C$$

$$\int \mathrm{sech}^2(f(x))f'(x)\,dx = \tanh(f(x)) + C$$