

Formulas to remember

$$1. e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$

$$2. e^\infty = \infty$$

$$3. e^{-\infty} = 0$$

$$4. \Gamma(n+1) = n! = n \Gamma(n)$$

$$5. \Gamma(n+1) = \int_0^\infty x^n e^{-x} dx$$

$$6. \Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$$

$$7. \int e^{ax} \sin bx dx = \frac{e^{ax}}{a^2+b^2} [a \sin bx - b \cos bx]$$

$$8. \int e^{ax} \cos bx dx = \frac{e^{ax}}{a^2+b^2} [a \cos bx + b \sin bx]$$

$$9. \sin^3 \theta = \frac{3 \sin \theta - \sin 3\theta}{4}$$

$$10. \cos^3 \theta = \frac{3 \cos \theta + \cos 3\theta}{4}$$

$$11. \sin^2 x = \frac{1 - \cos 2x}{2}$$

$$12. \cos^2 x = \frac{1 + \cos 2x}{2}$$

$$13. \sin A \cos B = \frac{\sin(A+B) + \sin(A-B)}{2}$$

$$14. \cos A \cos B = \frac{\cos(A-B) + \cos(A+B)}{2}$$

$$15. \sin A \sin B = \frac{\cos(A-B) - \cos(A+B)}{2}$$

$$16. (a+b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$$

$$17. (a-b)^3 = a^3 - b^3 - 3a^2b + 3ab^2$$

$$18. \sin(-x) = -\sin x$$

$$19. \cos(-x) = \cos x$$

$$20. e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \dots$$

$$21. \cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \dots$$

$$22. \sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} - \dots$$

$$23. \int_0^{\pi/2} \sin^p \theta \cdot \cos^q \theta d\theta = \frac{1}{2} \beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$$

$$\int a dx = ax$$

$$\int \frac{1}{x} dx = \ln x$$

$$\int e^x dx = e^x$$

$$\int a^x dx = \frac{a^x}{\ln a}$$

$$\int \ln x dx = x \ln x - x$$

$$\int \sin x dx = -\cos x$$

$$\int \cos x dx = \sin x$$

$$\int \tan x dx = \ln|\sec x|$$

$$\int \sec x dx = \ln|\sec x + \tan x|$$

$$\int \cot x dx = \ln|\sin x|$$

$$\int \operatorname{cosec} x dx = \ln|\operatorname{cosec} x - \cot x|$$

$$\int \sec^2 x dx = \tan x$$

$$\int \sec x \cdot \tan x dx = \sec x$$

$$\int \operatorname{cosec}^2 x dx = -\cot x$$

$$\int \tan^2 x dx = \tan x - x$$

$$\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1} \frac{x}{a}$$

$$\int \frac{dx}{a^2 + x^2} = \frac{1}{a} \tan^{-1} \frac{x}{a}$$

$$\int \frac{dx}{|x| \sqrt{x^2 - a^2}} = \frac{1}{a} \sec^{-1} \frac{x}{a}$$

$$\int \frac{1}{\sqrt{x^2 + a^2}} = \ln \left| \frac{x}{a} + \sqrt{1 + \frac{x^2}{a^2}} \right|$$