AMAT 217 OFFICIAL FORMULA SHEET

A: BASIC INTEGRALS

Let $r, \alpha, \beta \in \mathbb{R}$, $r \neq -1$, $\alpha \neq 0$ and $\beta > 0$.

1. $\int x^r \, dx = \frac{x^{r+1}}{r+1} + C$
2. $\int \frac{1}{x} \, dx = \ln|x| + C$
3. $\int e^{\alpha x} \, dx = \frac{1}{\alpha} e^{\alpha x} + C$
4. $\int \sin(\alpha x) \, dx = -\frac{1}{\alpha} \cos(\alpha x) + C$
5. $\int \cos(\alpha x) \, dx = \frac{1}{\alpha} \sin(\alpha x) + C$
6. $\int \tan(\alpha x) \, dx = \frac{1}{\alpha} \ln|\sec(\alpha x)| + C$
7. $\int \cot(\alpha x) \, dx = \frac{1}{\alpha} \ln|\sin(\alpha x)| + C$
8. $\int \sec(\alpha x) \, dx = \frac{1}{\alpha} \ln|\sec(\alpha x) + \tan(\alpha x)| + C$
9. $\int \csc(\alpha x) \, dx = \frac{1}{\alpha} \ln|\csc(x) - \cot(x)| + C$
10. $\int \sec^2(\alpha x) \, dx = \frac{1}{\alpha} \tan(\alpha x) + C$
11. $\int \csc^2(\alpha x) \, dx = -\frac{1}{\alpha} \cot(\alpha x) + C$
12. $\int \sec(\alpha x) \tan(\alpha x) \, dx = \frac{1}{\alpha} \sec(\alpha x) + C$
13. $\int \csc(\alpha x) \cot(\alpha x) \, dx = -\frac{1}{\alpha} \csc(\alpha x) + C$
14. $\int \frac{1}{\sqrt{\beta^2 - x^2}} \, dx = \sin^{-1}\left(\frac{x}{\beta}\right) + C$
15. $\int \frac{1}{\sqrt{\beta^2 + x^2}} \, dx = \sinh^{-1}\left(\frac{x}{\beta}\right) + C$
16. $\int \frac{1}{\sqrt{x^2 - \beta^2}} \, dx = \cosh^{-1}\left(\frac{x}{\beta}\right) + C$
17. $\int \frac{1}{x^2 + \beta^2} \, dx = \frac{1}{\beta} \tan^{-1}\left(\frac{x}{\beta}\right) + C$

B: BASIC TRIGONOMETRIC IDENTITIES

GROUP (*A*) :

(*i*) $\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)}$ (*ii*) $\cot(\theta) = \frac{\cos(\theta)}{\sin(\theta)}$ (*iii*) $\sec(\theta) = \frac{1}{\cos(\theta)}$ (*iv*) $\csc(\theta) = \frac{1}{\sin(\theta)}$

GROUP (*B*) :

(*i*) $\cos^2(\theta) + \sin^2(\theta) = 1$ (*ii*) $1 + \tan^2(\theta) = \sec^2(\theta)$ (*iii*) $\cot^2(\theta) + 1 = \csc^2(\theta)$

GROUP (*C*) :

(*i*) $\sin(2\theta) = 2\sin(\theta)\cos(\theta)$ (*ii*) $\cos(2\theta) = 2\cos^2(\theta) - 1$ (*iii*) $\cos(2\theta) = 1 - 2\sin^2(\theta)$

GROUP (*D*) :

(*i*) $\sin(-\theta) = -\sin(\theta)$ (*ii*) $\cos(-\theta) = \cos(\theta)$ (*iii*) $\tan(-\theta) = -\tan(\theta)$

END