Math 305

Methods of Integration – Solutions

1. $e^x - \tan x + c$

2. $\dfrac{x^3}{3} - 2x + 4\ln|x| + c$

3. $-\cos x + c$

4. $\ln(1+\sin x) + c$

5. $\dfrac{1}{2}\sin(2x^3 + x^2 + 4) + c$

6. $\dfrac{1}{4}(\ln x)^4 + c$

7. $e^{\tan x} + c$

8. $\dfrac{2}{5}(x+2)^{5/2} - \dfrac{4}{3}(x+2)^{3/2} + c$

9. $\dfrac{1}{2}\ln|x^2 + 2x - 5| + c$

10. $x\,\ln x - x + c$

11. $\dfrac{1}{3}(x^2 + 2x - 1)\sin 3x$
$\quad + \dfrac{2}{9}(x+1)\cos 3x - \dfrac{2}{27}\sin 3x + c$

12. $\dfrac{1}{2}(x+3)e^{2x} - \dfrac{1}{4}e^{2x} + c$

13. $\dfrac{x^3}{3}\ln x - \dfrac{x^3}{9} + c$

14. $x\,\tan^{-1} x - \dfrac{1}{2}\ln(1+x^2) + c$

15. $\dfrac{1}{2}(e^x \sin x - e^x \cos x) + c$

16. $\dfrac{1}{3}\sec^3\theta + c$

17. $\dfrac{1}{2}\theta + \dfrac{1}{4}\sin 2\theta + c$

18. $-\dfrac{1}{3}\csc^3\theta + c$

19. $\dfrac{1}{2}\sin^2\theta + c$

20. $\dfrac{1}{8}\tan^4 2\theta + c$

21. $\dfrac{1}{5}\cos^5\theta - \dfrac{1}{7}\cos^7\theta + c$

22. $\ln\left|x + \sqrt{x^2 - 1}\right| + c$

23. $\tan^{-1}(x+1) + c$

24. $\tan^{-1}(e^x) + c$

25. $32\left[\dfrac{1}{5}\left(\dfrac{\sqrt{x^2+4}}{2}\right)^5 - \dfrac{1}{3}\left(\dfrac{\sqrt{x^2+4}}{2}\right)\right] + c$

26. $\sin^{-1}(x-1) + c$

27. $-2\,\ln|x| + 3\,\ln|x+1| + c$

28. $3\,\ln|x| - \dfrac{3}{2}\ln|x^2+1| + \tan^{-1} x + c$

29. $-\dfrac{3}{4}\ln|x| + \dfrac{3}{4}\ln|x+2| - \dfrac{5}{2}(x+2)^{-1} + c$

30. $-\ln|x| + \dfrac{1}{2}\ln|x+1| + \dfrac{1}{2}\ln|x-1| + c$

31. $-\ln|e^x + 2| + \ln|e^x + 1| + c$

32. $-\ln|\cos x| + \tan^{-1}(\cos x) + c$

33. $\dfrac{2}{\sqrt{3}}\tan^{-1}\left(\dfrac{x^{1/2}}{3}\right) - \tan^{-1}\left(\dfrac{x^{1/2}}{2}\right) + c$