

Integration Competition Answers

1. 1

2. $\frac{\pi}{4}$

3. 2

4. $\ln\left(\frac{e}{\pi}\right)$

5:
$$\frac{\sqrt{2}}{4} \left(\ln \left| \frac{\tan u - \sqrt{2 \tan u} + 1}{\tan u + \sqrt{2 \tan u} + 1} \right| + 2 \arctan(\sqrt{2 \tan u} - 1) + 2 \arctan(\sqrt{2 \tan u} + 1) \right)$$

6. $\frac{\pi^2}{24}$

7. $6x^{\frac{1}{6}} - 6 \arctan(x^{\frac{1}{6}})$

8. $\frac{1}{2}$

9. $x - \arctan(\sqrt{x^2 - 1}) + \sqrt{x^2 + 1}$

10. 1

11. $\frac{2(x^6 + x^4 + x^{-4})^{\frac{5}{4}}}{5}$

12. $\frac{\pi}{4} + \frac{\pi}{4e^2}$

13. $\ln \left| \frac{\sqrt{1 + e^x} - 1}{\sqrt{1 + e^x} + 1} \right| + 2\sqrt{1 + e^x}$

14. $\pi \ln 2$

15. $\frac{1}{2} \ln \left| \frac{\sqrt{1 + e^{2x}} - 1}{\sqrt{1 + e^{2x}} + 1} \right|$

$$16. \pi \arcsin k$$

$$17. 2\pi$$

$$18. \ln \left| \frac{\tan\left(\frac{x}{2}\right) + 1}{\tan\left(\frac{x}{2}\right) + 3} \right|$$

$$19. \sum_{k=1}^{\infty} \frac{1}{k^k}$$

$$20. \frac{\pi^3}{8}$$

$$21. 2\pi \ln \pi$$

$$22. \frac{1}{4}(\pi - 1)$$

$$23. \frac{\pi^2}{12} - \frac{1}{2}$$

$$24. \frac{(4x-3)^{\frac{3}{2}}}{12} - \frac{x}{2}$$

$$25. \pi \ln \left(\frac{a + \sqrt{a^2 - b^2}}{2} \right)$$

$$26. \frac{1}{2}(x \sin(\ln x) + x \cos(\ln x))$$

$$27. \frac{\pi^2}{4}$$

$$28. 2 - \frac{\pi^2}{6}$$

$$29. \sqrt{x^2 + 1} \ln(x + \sqrt{x^2 + 1}) - x$$

$$30. 2\pi\sqrt{2}$$

$$31. 4\left(\sin\frac{x}{4}-\cos\frac{x}{4}\right)$$

$$32. (\ln 2)^2 - 2\ln 2 + 2 - \frac{\pi^2}{6}$$

$$33. \frac{\pi}{2} - \ln 2$$

$$34. e^{e^x}$$

$$35. \frac{\pi^2}{4}$$

$$36. \frac{1}{4}\arctan\left(\frac{x^2}{2}\right)$$

$$37. 2\arctan\sqrt{x-1}$$

$$38. \frac{\pi}{4}$$

$$39. \frac{\pi^2}{6}$$

$$40. \frac{\pi\ln 2}{8}$$