

AP Calculus AB
Review of Transcendental Functions

Name Key

Solve for x.

1. $\log_x 25 = 2$

$$\sqrt{x^2} = \sqrt{25}$$

$$x = \pm 5 \quad x = 5$$

2. $\log_3 x = 4$

$$3^4 = x$$

$$81 = x$$

3. $\log_7 343 = x$

$$7^x = 343$$

$$x = 3$$

4. $\ln 47 = 3x^2$

$$\sqrt{\frac{\ln 47}{3}} = \sqrt{x^2}$$

$$x = \pm \sqrt{\frac{\ln 47}{3}}$$

5. $\log_8 x = 3$

$$8^3 = x$$

$$512 = x$$

6. $\ln(x+2) = 5$

$$e^5 = x+2$$

$$e^5 - 2 = x$$

7. $\log_3 5 + \log_3 x - \log_3 10 = 1$

$$\log_3 5x - \log_3 10 = 1$$

$$\log_3 \frac{x}{2} = 1$$

$$3^1 = \frac{x}{2}$$

$$x = 6$$

8. $\log 300 - \log 6 + \log x = \log_2 4$

$$\log 50 + \log x = \log_2 4$$

$$\log 50x = 2$$

$$10^2 = 50x$$

$$50 = x$$

9. $\log_3(x+3) + \log_3(x+5) = 1$

$$\log_3(x+3)(x+5) = 1$$

$$3^1 = x^2 + 8x + 15$$

$$0 = x^2 + 8x + 12$$

$$0 = (x+6)(x+2)$$

$$x = -6 \quad x = -2$$

10. $\log_2 32 - \log_3 9 = \log_x 27$

$$5 - 2 = \log_x 27$$

$$3 = \log_x 27$$

$$x^3 = 27$$

$$x = 3$$

11. $5^{(x+2)} = 94$ ← extraneous

$$\log_5 94 = x+2$$

$$\log_5 94 - 2 = x$$

12. $e^{(x-8)} = 3$

$$\ln 3 = x-8$$

$$\ln 3 + 8 = x$$

13. $6^{(2x+1)} = 141$

$$\log_6 141 = 2x+1$$

$$x = \frac{\log_6 141 - 1}{2}$$

14. $7^{(x-4)} = 23^{(2x+1)}$

$$\ln 7^{(x-4)} = \ln 23^{(2x+1)}$$

$$(x-4)\ln 7 = (2x+1)\ln 23$$

$$x \cdot \ln 7 - 4\ln 7 = x \cdot 2\ln 23 + \ln 23$$

$$x \cdot \ln 7 - x \cdot 2\ln 23 = \ln 23 + 4\ln 7$$

$$x(\ln 7 - 2\ln 23) = \ln 23 + 4\ln 7$$

$$x = \frac{\ln 23 + 4\ln 7}{\ln 7 - 2\ln 23}$$

15. $64^{(x+11)} = 8^{(x-7)}$

$$8^{2(x+11)} = 8^{(x-7)}$$

$$2x+22 = x-7$$

$$x = -29$$

16. $e^{(5x+3)} = 173$

$$\ln 173 = 5x+3$$

$$x = \frac{\ln 173 - 3}{5}$$

17. $\frac{30}{1+2e^x} = 6$

$$30 = 6(1+2e^x)$$

$$5 = 1+2e^x$$

$$4 = 2e^x$$

$$2 = e^x$$

$$\ln 2 = x$$

18. $3e^{2x-1} = 81$

$$e^{2x-1} = 27$$

$$\ln 27 = 2x-1$$

$$x = \frac{\ln 27 + 1}{2} = \frac{3\ln 3 + 1}{2}$$