Exponential Equations

Given the equations below, use logarithms to find the value of "x". Show all your work and steps

Section A: Exact Value

1. $3^x = 2187$
2. $2^{x+3} = 131072$
3. $3^{x+3} = 729$
4. $5^x = 3125$
5. $4^{x-2} = 2097152$
6. $9^x = 27^{x-1}$

Section C: Logarithms Required

7. $(0.25)^x + 6 = 10$
8. $4(3^x) = 200$
9. $2(3^x) = 50$
10. $5(2^x) = 160$

Section D: Growth / Decay Models

11. $200(1.06)^x = 1000$
12. $152.2(1.0425)^x = 304$
13. $500(0.92)^x = 125$

Section E: Transformations

14. $3(1.25)^{x+3} = 100$
15. $2.5(0.85)^{x-2} = 1$
16. $7(1.1)^{x-4} = 70$

Section F: Advanced Bases

17. $6(\sqrt{3})^x = 1500$
18. $(2\sqrt{2})^x + 3 = 20$
19. $5(\sqrt{2})^x = 80$

Section G: Multi-Step / Structure

20. $-\frac{2}{3}\left(\frac{5}{8}\right)^x + 1 = 0$
21. $\sqrt{3}\left(\frac{\sqrt{2}}{3}\right)^x + 13 = 20$
22. $3^{2x} = 5^x$