Solve the equations involving logarithmic functions. I want the exact answer, not a decimal approximation.

1. $\log_2(x)=3$
2. $\log_3(x)=0$
3. $\log(x+20)=2$
4. $\log(x^2-5)=1$
5. $-2=\log_x(4)$ Rarely see these where the base is the unknown.
6. $\log_x(10)=3$
7. $\log_2(x+2)+\log_2(x-2)=5$
8. $\log\left(\frac{x-3}{2}\right)+\log\left(\frac{x+2}{7}\right)=0$
9. $\log(x+1)-\log(x)=3$
10. $\log_4(x)-\log_4(x+2)=2$
11. $\log_3(x)=\log_3(2)-\log_3(x-2)$
12. $\log(4)+\log(x)=\log(5)-\log(x)$
13. $\log_3(x)+\log_3(1/x)=0$
14. $6^x=3^{x+1}$ This one is messy, but do-able, by hand.

Solve the logarithmic equations. Show the exact answer, then round final answer to 4 decimal places. $6^x=3^{x+1}$

15. $e^{-\ln(w)}=3$
16. $4(1.02)^x=3(1.03)^x$

I don't see a 'by hand' method for the following. Use a graphing utility to solve, correct to 4 decimal places.

17. $2^x=3^{x-1}+5^{-x}$ Taking log of both sides doesn't work, because it's a sum on the right side, unlike #14.
18. $x^2=2^x$
19. The half-life of a radioactive isotope is 10,000 years. What's the decay rate?
20. The half-life of radioactive Carbon-14 is about 5730 years. If 15% of naturally occurring Carbon-14 has decayed in a sample of charcoal from a fire pit, how old is that fire pit?
21. If 79.3% of radioactiveo Carbon-14 remains in a sample, how old is that sample?