Simplify.

1. $27^{2/3}$

2. $25^{3/2}$

3. $6^{\sqrt{5}} * 6^{\sqrt{5}}$

4. $(4^{\sqrt{3}})^{\sqrt{5}}$

5. $(3^{3/5})^{-5}$

6. $\dfrac{7^{\sqrt{5}+2}}{49}$

7. $\sqrt[10]{32} \div \sqrt[8]{4}$

8. $\sqrt[3]{4} * \sqrt[3]{4}$

9. $\sqrt[3]{x^2} * \sqrt[3]{x^4}$

10. $\dfrac{5}{\sqrt[3]{x}}$

11. $\sqrt[3]{4^{12\pi}}$

12. $(-27)^{-2/3}$

13. $\sqrt[3]{8x^5y^7}$

14. $\sqrt[3]{\dfrac{3y^{10}}{4x^5}}$

Given $f(x) = 3x$, $g(x) = 2x - 1$, $h(x) = \sqrt{x + 2}$, find the results of the following functions.

15. $f(x) - g(x)$

16. $f(x) + g(x)$

17. $f(x) * g(x)$

18. $f(g(2))$

19. $g(f(x))$

20. $g(g(3))$

Find the inverses $[f^{-1}(x) = ???]$ of the following functions.

21. $f(x) = 3x + 2$ 　　　　　　　　　　　　**22.** $f(x) = 5x^3 + 2$

23. $f(x) = \frac{2}{5}x + 3$ 　　　　　　　　　　　**24.** $f(x) = x^2 + 1, x \geq 0$

Solve. Be sure to check for extraneous roots.

25. $3^x = \sqrt{27}$ 　　　　　　　　　　　　**26.** $8^{2+x} = 2$

27. $(3x - 1)^{-2/3} = \frac{1}{4}$ 　　　　　　　　　**28.** $\sqrt[3]{x} + 10 = 16$

29. $\sqrt{2x - 7} = \sqrt{x + 3}$ 　　　　　　　　**30.** $\sqrt{11x + 3} = 2x$

31. $x^{2/3} = 16$

Verify that f and g are inverse functions (when you put one into the other, the result is x). Show all steps!

32. $f(x) = 3x + 1;\ \ g(x) = \frac{x-1}{3}$

33. $f(x) = \frac{1}{2}x - 4;\ \ g(x) = 2x + 8$