Simplify.

1. $27^{2/3}$

9

2. $25^{3/2}$

125

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

$36^{\sqrt{5}}$

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

$4^{\sqrt{15}}$

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

$\dfrac{1}{27}$

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

$7^{\sqrt{5}}$

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

$\sqrt[4]{2}$

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

$2\sqrt[3]{2}$

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

x^2

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

$\dfrac{5\sqrt[3]{x^2}}{x}$

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

256^{π}

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

$\dfrac{1}{9}$

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

$2xy^2\sqrt[3]{x^2y}$

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

$\dfrac{y^3\sqrt[3]{6xy}}{2x^2}$

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

15. $f(x) - g(x)$
$x + 1$

16. $f(x) + g(x)$
$5x - 1$

17. $f(x) * g(x)$
$6x^2 - 3x$

18. $f(g(2))$
9

19. $g(f(x))$
$6x - 1$

20. $g(g(3))$
9

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

21. $f(x) = 3x + 2$

$f^{-1}(x) = \dfrac{x-2}{3}$

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

$f^{-1}(x) = \dfrac{\sqrt[3]{25x-50}}{5}$

23. $f(x) = \dfrac{2}{5}x + 3$

$f^{-1}(x) = \dfrac{5x-15}{2}$

24. $f(x) = x^2 + 1, x \geq 0$

$f^{-1}(x) = \sqrt{x-1}$

Solve. Be sure to check for extraneous roots.

25. $3^x = \sqrt{27}$

$x = \dfrac{3}{2}$

26. $8^{2+x} = 2$

$x = -\dfrac{5}{3}$

27. $(3x-1)^{-2/3} = \dfrac{1}{4}$

$x = 3$

28. $\sqrt[3]{x} + 10 = 16$

$x = 216$

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

$x = 10$

30. $\sqrt{11x+3} = 2x$

$x = 3$

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

$x = 64$

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

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

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