Lecture 7.1 to 7.3

1. What number is equal to $\sqrt{9}$?

3

2. Find all real square roots of 25

5

3. Simplify.

$\sqrt{\frac{25}{49}}$ $5/7$

Be sure to write your answer in simplest form.

PEMDAS

Radicals=parenthesis

4. Evaluate the following.

$-\sqrt{49} =$ -7

$\sqrt{-36} =$ NOT Real

5. Simplify.

$\sqrt[2]{y^{20}}$ $y^A \cdot y^A = y^{20}$ $2A = 20$ $A = 10$

Assume that the variable represents a positive real number.

$(y^{20})^{1/2} = y^{20 \times \frac{1}{2}} = y^{10}$

6. Simplify.

$\sqrt{4y^6} = \sqrt{4} \cdot \sqrt{y^6} = 2y^3$

Assume that the variable y represents a positive real number.

7. Simplify each expression.

Assume that the variables represent *any* real numbers.

$\sqrt{x^{18}} = x^9$

$\sqrt{z^{12}} = z^6$

8. Find the value of $\sqrt[3]{8}$. $= (2^3)^{1/3} = 2^1$

$\sqrt[3]{a^b} = (a^b)^{1/3} = a^{b/3}$

9. Evaluate the following.

(a) $\sqrt[4]{-81} =$ ___ $(-81)^{1/4} =$ Not real

(b) $\sqrt[3]{-27} =$ ___ $((-3)^3)^{1/3} = -3$

$2 \overline{)8}$
$2 \overline{)4}$
2

10. Simplify.

$\sqrt[4]{\frac{81}{16}} = \frac{3}{2}$

Be sure to write your answer in lowest terms.

11. Simplify.

$\sqrt[4]{625\,v^{16}} = \sqrt[4]{5^4} \cdot \sqrt[4]{v^{16}}$

Assume that the variable represents a positive real number.

$5\,(v^{16})^{1/4}$

$5v^4$

12. Simplify each radical expression as much as possible.

Assume that the variables represent *any* real numbers.

(a) $\sqrt[5]{(y+9)^5} = ((y+9)^5)^{1/5} = y+9$

(b) $\sqrt[4]{z^4} = (z^4)^{1/4}$

$|z|$

special problem...
if radical is even/ you get absolute value in answer

13. Find the domain of the function.

$g(x) = \sqrt{x-7}$

Write your answer using interval notation.

$x-7 \geq 0$ [7,oo)

$x \geq 7$

14. Find the domain of the function.

$v(x) = \sqrt{-x+5}$

Write your answer using interval notation.

$-x + 5 \geq 0$

$5 \geq x$ (-oo, 5]

15. Find the domains of the functions f and g

$f(x) = \sqrt[4]{x-7}$ $x - 7 \geq 0$ [7, oo)

$g(x) = \sqrt[3]{2x+4}$ (-oo,oo)

Write your answers using interval notation.

Cube roots...no problem!

16. Simplify.

$\sqrt{75}$ $\sqrt{25}\cdot\sqrt{3}$

$5\cdot\sqrt{3}$

17. Simplify.

$\sqrt{128}$ $\sqrt{64}\sqrt{2}$

$8\sqrt{2}$

$2\,|\,128$
$2\,|\,64$
$2\,|\,32$
16

$\sqrt{16}\cdot\sqrt{8}$

$\sqrt{16}\sqrt{4}\sqrt{2}$

$4\cdot 2\cdot\sqrt{2}$

18. Simplify.

$\sqrt{75v^{10}}$ $\sqrt{25v^{10}}\cdot\sqrt{3}$

Assume that the variable v represents a positive real number.

$5v^5\cdot\sqrt{3}$

19. Simplify.

$\sqrt{u^{19}}$ $\sqrt{u^{18}}\cdot\sqrt{u}$

Assume that the variable represents a positive real number.

$u^9\cdot\sqrt{u}$

20. Simplify.

$\sqrt{20y^{19}}$ $\sqrt{4}\sqrt{y^{18}}\sqrt{5y}$

Assume that the variable represents a positive real number.

$2y^9\sqrt{5y}$

21. Simplify.

$\sqrt{20t^{10}u^3}$ $\sqrt{4t^{10}u^2}\sqrt{5u}$

Assume that all variables represent positive real numbers.

$2t^5u\cdot\sqrt{5u}$

22. Write the following in simplified radical form.

$\sqrt[3]{32}$ $\sqrt[3]{8}\sqrt[3]{4}$

$2\sqrt[3]{4}$

23. Write the following in simplified radical form.

$\sqrt[4]{v^{14}}$ $\sqrt[4]{v^{12}}\sqrt[4]{v^2}$

Assume that the variable represents a positive real number.

$v^3\sqrt{v}$

$(v^{12})^{1/4} = v^3$

$(v^2)^{1/4} = v^{2/4}$

$= v^{1/2}$

24. Write the following in simplified radical form.

$\sqrt[5]{160y^6}$ $\sqrt[5]{2^5y^5}$ $\sqrt[5]{5y}$

Assume that the variable represents a positive real number.

$2y\sqrt[5]{5y}$

$2\,|\,160$
$2\,|\,80$
$2\,|\,40$
$2\,|\,20$
$2\,|\,10$
5

25. Write the following expression in simplified radical form.

$\sqrt[3]{81y^7z^6}$ $\sqrt[3]{3^3y^6z^6}\sqrt[3]{3^1y^1}$

Assume that all of the variables in the expression represent positive real numbers.

$3y^2z^2\cdot\sqrt[3]{3y}$

1. Write the following as an exponential expression.

$\sqrt[8]{v^3} = (v^3)^{1/8} = v^{3/8}$

2. Evaluate.

$81^{\frac{1}{4}} =$ ____

$125^{\frac{1}{3}} =$ ____

$(81)^{1/4} = (3^4)^{\frac{1}{4}} = 3$

$3 \cdot 3 \cdot 3 \cdot 3$

$(125)^{1/3} = (5^3)^{\frac{1}{3}} = 5$

$5 \cdot 5 \cdot 5$

3. Evaluate the following.

(a) $(-16)^{\frac{1}{4}} =$

(b) $(-8)^{\frac{1}{3}} =$

3. evaluate

$(-16)^{1/4}$ $\quad \sqrt[4]{-16} = \emptyset$

$(-8)^{1/3} = \sqrt[3]{-8} = \boxed{-2}$

$(-2^4)^{1/4} = (-1)^{1/4}(2^4)^{1/4}$ No Real solution

$((-2)^3)^{1/3} = -2$

$(-1)^{1/3}(8)^{1/3} = (-1)(2^3)^{1/3} = -2$

4. Simplify.

$16^{\frac{3}{2}} = (2^4)^{3/2} = 2^6 = 64$

2|16
2|8
2|4
2|2
1

16^(3/2)
(3/2) 64

5. Simplify. Write your answers without exponents.

$\left(\frac{1}{25}\right)^{-\frac{3}{2}} = \square$

$8^{-\frac{4}{3}} = \square$

(1/25)^(-3/2)
125

$\frac{1}{5^2} = 5^{-2}$

$(5^{-2})^{-3/2} = 5^3$

$(2^3)^{-4/3} \to 2^{-4} = \frac{1}{2^4} = \frac{1}{16}$

6. Simplify.

$u^{\frac{3}{5}} \cdot u^{\frac{2}{7}} = u^{31/35}$

Assume that the variable represents a positive real number.

$u^a u^b = u^{a+b}$

3.5+2.7
31.35

$\frac{3}{5} \cdot \frac{7}{7} + \frac{2}{7} \cdot \frac{5}{5} = \frac{21+10}{35}$

7. Simplify.

$$\frac{v^{\frac{3}{7}}}{v^{\frac{3}{4}}}$$

Write your answer using only a positive exponent.
Assume that the variable represents a positive real number.

$\frac{v^a}{v^b} = v^{a-b}$

3.7-3.4
-9.28

$v^{-9/28} = \frac{1}{v^{9/28}}$

8. Simplify the expression.

$$\frac{y^{\frac{1}{3}}}{y^{\frac{1}{4}}\,y^{-\frac{1}{2}}}$$

$y^{1/3}\,y^{1/2}\,y^{-1/4} = y^{1/3+1/2-1/4} = y^{7/12}$

Write your answer using only positive exponents.
Assume that all variables are positive real numbers.

9. Simplify.

$$\left(y^{\frac{7}{10}}\right)^{5} = y^{3.5}$$

Write your answer without parentheses.
Assume that the variable represents a positive real number.

10. Simplify the expression.

$$\left(c^{5}\cdot b^{\frac{5}{3}}\right)^{-\frac{1}{2}} = c^{-5/2}\,b^{-5/6} = \frac{1}{c^{5/2}\,b^{5/6}}$$

Write your answer without using negative exponents.
Assume that all variables are positive real numbers.

1. Simplify.

$$9\sqrt{11}+3\sqrt{11} = 12\sqrt{11}$$

2. Simplify.

$$\sqrt{63}+3\sqrt{28}$$

$\sqrt{9}\sqrt{7}+3\cdot\sqrt{4}\cdot\sqrt{7} = 3\sqrt{7}+\overset{3\cdot 2}{6}\sqrt{7} = 9\sqrt{7}$

3. Simplify.

$$4\sqrt{5}+5\sqrt{45}-\sqrt{20}$$

$\sqrt{5}$ $\sqrt{5}$ E

4. Simplify.

$$\sqrt{75\,w}-\sqrt{12\,w}$$

Assume that the variable represents a positive real number.

$-\sqrt{3w}$

5. Simplify.

$$6x^2\sqrt{72x}-\sqrt{18x^5}$$

Assume that the variable represents a positive real number.

6. Simplify as much as possible.

$$x\sqrt{75u^5}-2u^2\sqrt{3ux^2}$$

Assume that all variables represent positive real numbers.

7. Simplify.

$$-\sqrt[3]{54}-4\sqrt[3]{16}$$

8. Simplify.

$$-\sqrt[3]{54x^{14}}-3\sqrt[3]{16x^{14}}$$

Assume that the variable represents a positive real number.

9. Simplify.

$$\sqrt{7}\cdot\sqrt{3}$$

10. Simplify.

$$\sqrt{6}\cdot\sqrt{12}$$

11. Simplify.

$$\sqrt{80}\times 2\sqrt{20}$$

12. Simplify.

$$\sqrt{7z}\cdot\sqrt{3z}$$

Assume that the variable represents a positive real number.

13. Simplify.

$$\sqrt{3c^3}\sqrt{6c^2}$$

Assume that the variable represents a positive real number.

14. Simplify.

$$\sqrt{15y^6x^2}\sqrt{5yx^3}$$

$\sqrt{75}\sqrt{y^7}\sqrt{x^5}$

Assume that all variables represent positive real numbers.

15. Simplify.

$\sqrt[4]{4} \cdot \sqrt[4]{20}$ $= \sqrt[4]{2^4} \cdot \sqrt[4]{5}$

$= 2\sqrt[4]{5}$

$2 \mid 80$
$2 \mid 40$
$2 \mid 20$
$2 \mid 10$
5

16. Simplify.

$\sqrt[4]{4w^3} \cdot \sqrt[4]{20w^2}$ $= \sqrt[4]{80w^5} = 2w\sqrt[4]{5w}$

Assume that the variable represents a positive real number.

17. Multiply.

$\sqrt{5}(\sqrt{6}-6)$ $\sqrt{30} - 6\sqrt{5}$

Simplify your answer as much as possible.

18. Multiply.

$\sqrt{5}(\sqrt{7}-3\sqrt{10})$

Simplify your answer as much as possible.

foil

19. Multiply.

$(3\sqrt{6}+2)(5+4\sqrt{10})$ $15\sqrt{6} + 12\sqrt{60} + 10 + 8\sqrt{10}$

Simplify your answer as much as possible.