3.2 cont. Simplifying nth Roots
3.3 Function Operations

even index

ex: Simplify. If no real value exists, write "nonreal."

a) $\sqrt[3]{40} = 2\sqrt[3]{5}$

b) $-\sqrt[4]{162} = -3\sqrt[4]{2}$

c) $\sqrt[5]{-250} = -\sqrt[5]{250} = -\sqrt[5]{5 \cdot 5 \cdot 5 \cdot 2}$

ex: Simplify. If no real value exists, write "nonreal."

d) $\frac{5}{\sqrt[3]{25}} \cdot \frac{\sqrt[3]{5}}{\sqrt[3]{5}} = \frac{\cancel{5}\sqrt[3]{5}}{\cancel{5}} = \sqrt[3]{5}$

$(-2)^2 = 4$

$-2^2 = -1 \cdot 2^2$
$= -4$

e) $-25^{3/2} = -1 \cdot 25^{3/2}$
$-1 \cdot (\sqrt{25})^3 = -125$

f) $(-25)^{3/2}$ nonreal

$\sqrt{-}$

Simplifying nth Roots Involving Variables

$\sqrt[2]{(-3)^2} = \sqrt{9}$
$= 3$

$\sqrt[3]{x^3}$
x

$$\sqrt[n]{x^n} = \begin{cases} |x|, & \text{if n is even} \\ x, & \text{if n is odd} \end{cases}$$

ex: Simplify. Use absolute value when necessary.

a) $\sqrt[3]{x^4} = \sqrt[3]{x^3} \cdot \sqrt[3]{x^1} = x\sqrt[3]{x}$

$\sqrt[3]{81} = \sqrt[3]{27} \cdot \sqrt[3]{3}$
$3\sqrt[3]{3}$

ex: Simplify. Use absolute value when necessary.

b) $\sqrt[5]{x^{22}} = \underbrace{\sqrt[5]{x^5} \cdot \sqrt[5]{x^5} \cdot \sqrt[5]{x^5} \cdot \sqrt[5]{x^5}} \cdot \sqrt[5]{x^2} = x^4\sqrt[5]{x^2}$

$x^4\sqrt[5]{x^2}$

c) $\sqrt[7]{x^{17}} = x^2\sqrt[7]{x^3}$

d) $\sqrt[9]{x^{21}}$ $\quad x^2\sqrt[9]{x^3}$

ex: Simplify. Use absolute value when necessary.

e) $\sqrt[3]{16x^4y^6z^2} = 2xy^2\sqrt[3]{2xz^2}$

f) $\sqrt[5]{-96xy^{10}z^{14}} = -\sqrt[5]{96xy^{10}z^{14}}$

$= -2y^2z^2\sqrt[5]{3xz^4}$

$$\begin{array}{r} 32 \\ \times 3 \\ \hline 96 \end{array}$$

ex: Simplify. Use absolute value when necessary.

g) $\sqrt{x} = \sqrt{x}$

$\sqrt{(-2)^6}$ $\quad \sqrt[3]{2^6} = 2^3$

$\sqrt{2^6} = 2^3 \longrightarrow 8$

h) $\sqrt[2]{x^4} = x^2$

You will need absolute value IF

Even index
Even exponent inside
Odd exponent outside

i) $\sqrt[2]{x^6} = |x^3|$

ex: Simplify. Use absolute value when necessary.

j) $\sqrt[4]{x^8} = x^2$

$\sqrt[4]{(-2)^5}$ $\sqrt[4]{2^5}$

nonreal

k) $\sqrt[4]{x^5} = x\sqrt[4]{x}$

ex: Simplify. Use absolute value when necessary.

l) $\sqrt[6]{x^6 y^{12} z^{20}} = |x|y^2|z^3|\sqrt[6]{z^2} = |xz^3|y^2\sqrt[6]{z^2}$

m) $\sqrt[4]{48x^3y^{12}z^{24}} = 2|y^3|z^6\sqrt[4]{3x^3}$

ex: Simplify. Use absolute value when necessary.

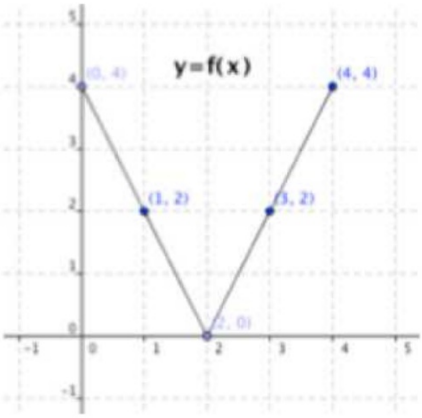
n) $\sqrt{200x^3y^4z}$ $= 10xy^2\sqrt{2xz}$

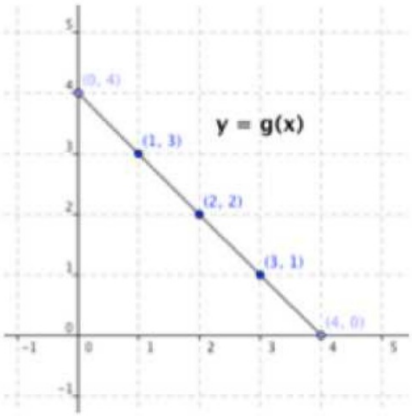
o) $\sqrt[3]{-16xy^3z^{10}}$ $-2yz^3\sqrt[3]{2xz}$

Function Operations

Addition	$f(x)+g(x)=(f+g)(x)$
Subtraction	$f(x)-g(x)=(f-g)(x)$
Multiplication	$f(x)g(x)=(fg)(x)$
Division	$\frac{f(x)}{g(x)}=\left(\frac{f}{g}\right)(x)$

3.3 Notes - WKST





#4-7

1. $(f+g)(3) = f(3) + g(3)$

$2 + 1$

3

2. $(f-g)(1)$ $f(1) - g(1)$

$2 - 3$

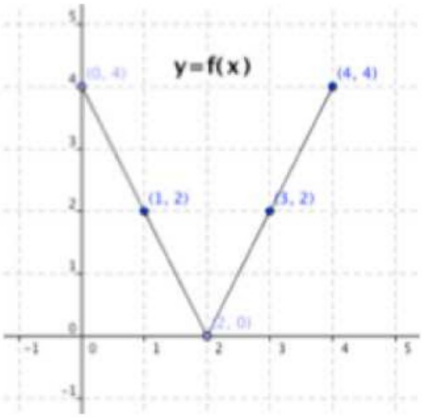
-1

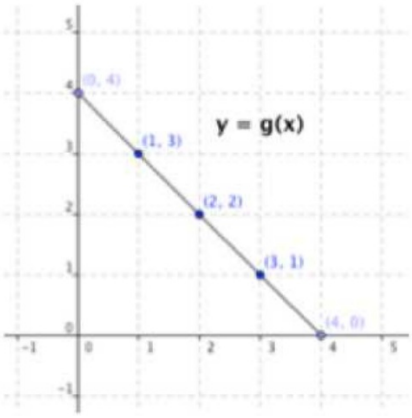
3. $(fg)(4) = f(4) \cdot g(4)$

$4 \cdot 0$

0

3.3 Notes - WKST





4. $(fg)(0)$ 16

5. $\left(\frac{g}{f}\right)(1)$ $\frac{3}{2}$

6. $\left(\frac{f}{g}\right)(3)$ 2

7. $-5(fg)(2)$ 0