

Math 99 Worksheet #4 Solutions

1. Evaluate the following.

(a) $-\sqrt[3]{64} = -(4) = -4$ since $4^3 = 64$

(b) $\sqrt[3]{13^3} = 13$

(c) $81^{1/2} = \sqrt{81} = 9$

(d) $8^{4/3} = (8^{1/3})^4 = (\sqrt[3]{8})^4 = 2^4 = 16$ or $8^{4/3} = (8^4)^{1/3} = \sqrt[3]{4096} = 16$

2. Simplify the following.

(a) $x^{1/3} \cdot x^{1/4} = x^{\frac{1}{3} + \frac{1}{4}} = x^{\frac{4}{12} + \frac{3}{12}} = x^{7/12}$

(b) $\sqrt{5} \cdot \sqrt{z} = \sqrt{5z}$

(c) $\sqrt{\frac{a^2}{9}} = \frac{\sqrt{a^2}}{\sqrt{9}} = \frac{a}{3}$

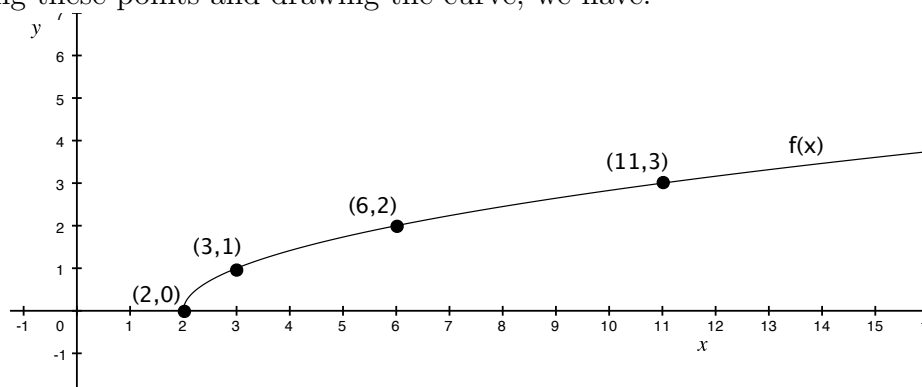
(d) $\sqrt{75} = \sqrt{25 \cdot 3} = \sqrt{25} \cdot \sqrt{3} = 5\sqrt{3}$

3. Graph the function $f(x) = \sqrt{x-2}$ and give its domain and range.

Note that the square root is only defined for positive values inside the radical. So, we must have that $x-2 \geq 0 \Rightarrow x \geq 2$. Consider the following values.

x	y
2	$\sqrt{2-2} = 0$
3	$\sqrt{3-2} = 1$
6	$\sqrt{6-2} = 2$
11	$\sqrt{11-2} = 3$

Plotting these points and drawing the curve, we have:



4. Simplify the following.

$$(a) (-32)^{3/5} = ((-32)^{1/5})^3 = (-2)^3 = -8$$

$$(b) \left(\frac{125}{27}\right)^{-1/3} = \left(\frac{27}{125}\right)^{1/3} = \frac{\sqrt[3]{27}}{\sqrt[3]{125}} = \frac{3}{5}$$

$$(c) k^{1/3}(3k^{5/3} + k^{-1/3}) = 3k^{1/3}k^{5/3} + k^{1/3}k^{-1/3} = 3k^{\frac{1}{3}+\frac{5}{3}} = 3k^{\frac{1}{3}-\frac{1}{3}} = 3k^{\frac{6}{3}} + k^0 = 3k^2 + 1$$

$$(d) \frac{a^{3/4}}{a^{5/4} \cdot a^{-2}} = \frac{a^{3/4}a^2}{a^{5/4}} = \frac{a^{\frac{3}{4}+\frac{8}{4}}}{a^{5/4}} = \frac{a^{11/4}}{a^{5/4}} = a^{\frac{11}{4}-\frac{5}{4}} = a^{6/4} = a^{3/2}$$

$$(e) \sqrt{98x^3} = \sqrt{49 \cdot 2 \cdot x^2 \cdot x^1} = \sqrt{49} \sqrt{x^2} \sqrt{2x} = 7x\sqrt{2x}$$

$$(f) \sqrt[6]{\sqrt[4]{x^2}} = ((x^2)^{\frac{1}{4}})^{\frac{1}{6}} = x^{2 \cdot \frac{1}{4} \cdot \frac{1}{6}} = x^{1/12}$$

$$(g) \sqrt[3]{250a^2b^7} = \sqrt[3]{125 \cdot 2 \cdot a^2 \cdot b^6 \cdot b^1} = \sqrt[3]{125} \sqrt[3]{b^6} \sqrt[3]{2a^2b} = 5b^2 \sqrt[3]{2a^2b}$$

$$(h) \sqrt{\frac{x^{22}}{32}} = \frac{\sqrt{x^{22}}}{\sqrt{32}} = \frac{x^{11}}{\sqrt{16 \cdot 2}} = \frac{x^{11}}{4\sqrt{2}}$$

$$(i) -\sqrt[3]{-125x^6y^9z^4} = -\sqrt[3]{-125 \cdot x^6 \cdot y^9 \cdot z^3 \cdot z^1} = -\sqrt[3]{-125} \sqrt[3]{x^6} \sqrt[3]{y^9} \sqrt[3]{z^3} \sqrt[3]{z} \\ = -(-5)x^2y^3z\sqrt[3]{z} \\ = 5x^2y^3z\sqrt[3]{z}$$