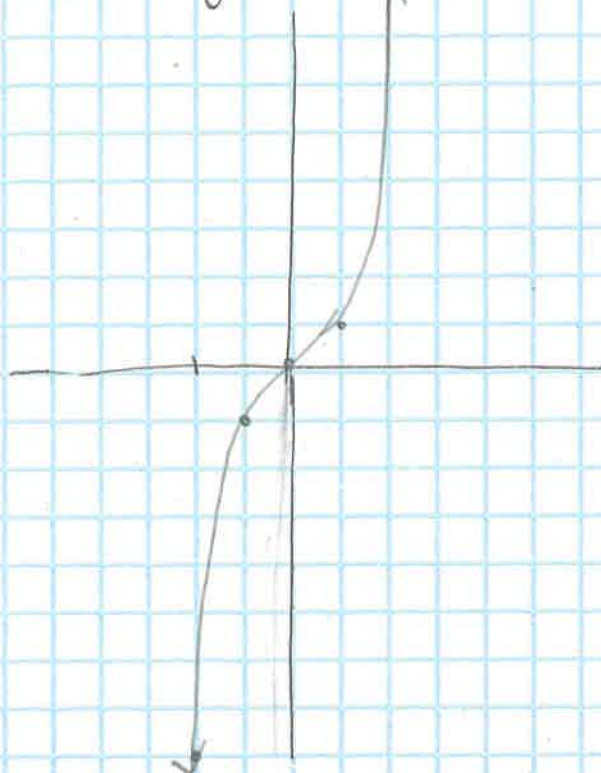


5.1 Notes

Graphing a cubic. $y = x^3 \leftarrow$ Parent function

x	y
-3	-27
-2	-8
-1	-1
0	0
1	1
2	8
3	27



index

$\downarrow$
 $\sqrt[n]{c}$

radicand

Solve $x^3 = 125$ take cube root

$$x^3 - 125 = 0$$

$$(x-5)(x^2+5x+25)=0$$

$$x=5$$

give imaginary roots

$$x^4 = 16$$

$$x^4 - 16 = 0$$

$$(x^2 - 4)(x^2 + 4) = 0$$

* even degree polynomial $\rightarrow \pm$

* odd degree $\rightarrow$ only + or - but not both

$$x = \pm 2$$

$\uparrow$
real roots

$$x = \pm 2i$$

$\uparrow$
imaginary roots

diff
of
squares

Properties of exponents

$$\sqrt[n]{x^m} = x^{m/n} = (x^{1/n})^m \quad \text{where } n \text{ is an integer}$$

$$\textcircled{1} \quad 27^{2/3} = (27^{1/3})^2 = (\sqrt[3]{27})^2 = 9$$

$$\textcircled{2} \quad 25^{1/2} = \sqrt{25} = 5$$

$$\textcircled{3} \quad 32^{2/5} = (\sqrt[5]{32})^2 = 4$$

$$27^{-2/3} = (\sqrt[3]{27})^{-2} = (3)^{-2} = \frac{1}{9}$$

negative exponent finds the reciprocal

$$16^{-1/4} = (\sqrt[4]{16})^{-1} = \frac{1}{2}$$

Ex: The Fujita scale rating, F of a tornado is represented by $F = \sqrt[3]{\left(\frac{W}{14.1}\right)^2} - 2$

where W is the estimated wind speed of the tornado in mph.

What is the rating for wind speeds of 120 mph?

$$F = \sqrt[3]{\left(\frac{120}{14.1}\right)^2} - 2 = 2$$

$$F = 2$$

Simplify

$$\begin{aligned} 1) \quad \sqrt[5]{32m^{15}} &= \sqrt[5]{32} \cdot \sqrt[5]{m^{15}} \\ &= 2m^{15/5} \\ &= 2m^3 \end{aligned}$$

$$2) \quad \sqrt[4]{x^{20}y^8} = x^{20/4} \cdot y^{8/4} = |x^5|y^2$$

need absolute value
b/c in original x has an
even exponent

$$3) \quad \sqrt[3]{-8a^3y^9} = -2ay^3$$

$$4) \quad \sqrt[4]{256x^{12}y^{24}} = 4|x^3|y^6$$

Solve

$$\textcircled{1} \quad 2x^5 = 64$$

$$x^5 = 32$$

$$x = 2$$

$$\textcircled{2} \quad 5x^3 = 320$$

$$x^3 = 64$$

$$x = 4$$

$$\textcircled{3} \quad 2p^4 = 162$$

$$\sqrt[4]{p^4} = \sqrt[4]{81}$$

$$p = \pm 3$$

5.1 Notes Cont'd

- ① One cube shaped container has an edge length 2 cm longer than the edge of the 2nd cube.

The volume of the larger cube is 729 cm^3

- When the larger cube empties into the smaller cube, how much water will spill?

$$((x+2)^3 = 729)^{1/3}$$

$$x+2 = 9$$

$$x = 7 \leftarrow \text{edge of smaller cube}$$

$$V = 7^3 = 343 \text{ cm}^3$$

$$729 - 343 = 386 \text{ how much water spills}$$

- ② One cube has an edge length 3 cm shorter than the edge length of the 2nd cube.

The volume of the smaller cube is 200 cm^3

$$(x-3)^3 = 200$$

$$x-3 = 5.848$$

$$x = 8.848$$

$$(8.848)^3 = 692.693 \text{ cm}^3$$