Solve

$$25^{3x+1} = 125^{x-3}$$

$\Rightarrow 5^2 = 25$

$5^3 = 125$

$$(5^2)^{3x+1} = (5^3)^{x-3}$$

$$5^{2(3x+1)} = 5^{3(x-3)}$$

$x^a = x^b$ then $a = b$

$(x^a)^b = x^{a \cdot b}$

$$2(3x+1) = 3(x-3)$$

$$6x + 2 = 3x - 9$$

$$-3x \quad -2 \qquad -3x \quad -2$$

$$\frac{3x}{3} = \frac{-11}{3}$$

$$x = \frac{-11}{3}$$

4. Solve.

a. $3^x = \frac{1}{9}$ **b.** $\left(\frac{5}{3}\right)^x = \frac{27}{125}$ **c.** $\left(\frac{1}{3}\right)^x = 243$ **d.** $5 \cdot 3^x = 5$

5. Solve each equation for positive values of x. If answers are not exact, approximate to two decimal places.

a. $x^7 = 4000$ **b.** $x^{0.5} = 28$ **c.** $x^{-3} = 247$

d. $5x^{1/4} + 6 = 10.2$ **e.** $3x^{-2} = 2x^4$ **f.** $-3x^{1/2} + (4x)^{1/2} = -1$

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$( )^{1/7}$ $( )$

$x^7 = 400$

$x^{1/4} = $

$(xy)^n = x^n y^n$

$-3x^{1/2} + 4^{1/2}\, x^{1/2} = -1$

$-3x^{1/2} + 2x^{1/2} = -1$

$-3x^2 + 2x^2$

$-1x^2$

$-3x + 2x = -1x$

$\frac{-1x^{1/2}}{-1} = \frac{-1}{-1}$

$(x^{1/2})^2 = (1)^2$

$x = 1$

$\frac{3x^{-2}}{x^{-2}} = \frac{2x^4}{x^{-2}}$

$3 = 2x^{4--2} = 2x^6$

$\frac{3}{2} = \frac{2x^6}{2}$

$(1.5)^{1/6} = (x^6)^{1/6}$

$1.07 \approx x^1$

$3(1.07)^{-2} = 2(1.07)^4$

Exponential family

$y = b^x$

x = variable

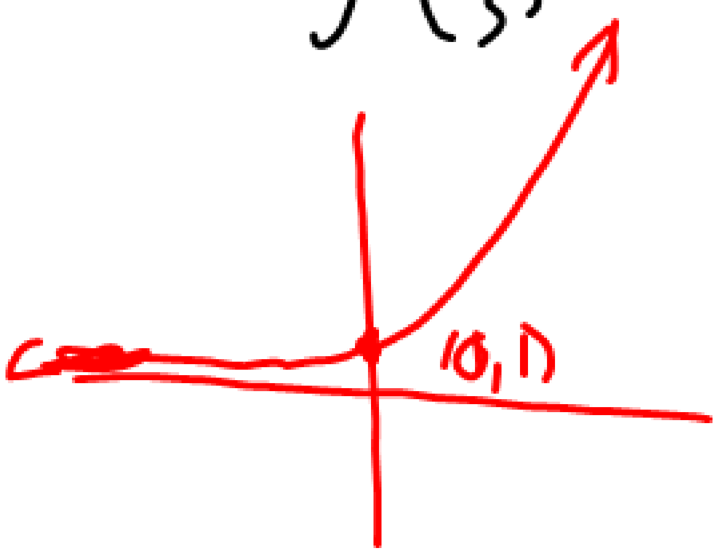
b & n are constants

variable is in exponent

$y = 2^x$

$y = 7^x$

$y = \left(\frac{1}{3}\right)^x$



Power family

$y = x^n$

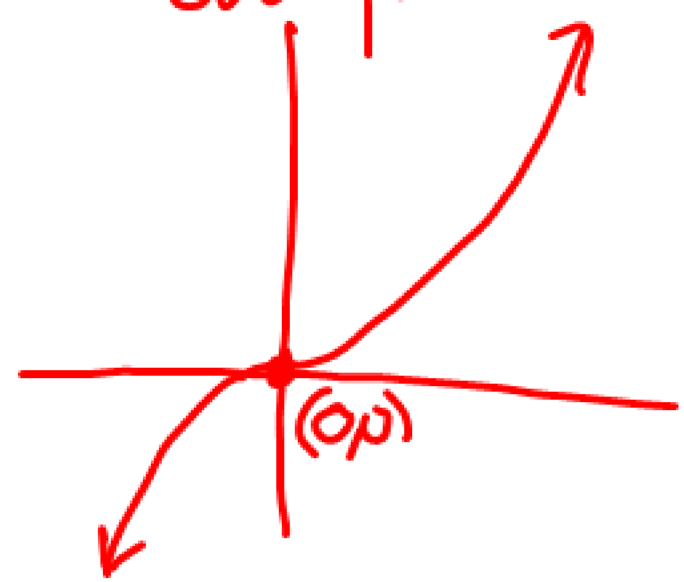
variable is the base

$y = x^2$

$y = x^7$

$y = x^{1/3}$

odd power



even power

Solve

$$\underline{25}^{3x+7} = \underline{125}^{x-4}$$

$$5^2 = 25$$

$$\underline{5}^3 = 125$$

$$(5^2)^{3x+7} = (5^3)^{x-4}$$

$$x^a = x^b \Rightarrow a = b$$

$$5^{2(3x+7)} = 5^{3(x-4)}$$

$$(a^x)^y = a^{x \cdot y}$$

$$\underline{5}^{6x+14} = \underline{5}^{3x-12}$$

$$6x+14 = 3x-12$$

$$-3x \quad -14 \quad -3x \quad -14$$

$$\frac{3x}{3} = \frac{-26}{3}$$

$$x = -\frac{26}{3} = -8\tfrac{2}{3} = -8.\overline{6}$$

$$25^{3(-8.\overline{6})+7} = 125^{-8.\overline{6}-4}$$

c. Look for a connection between your answers to 11a and b and the values in the table. State a conjecture or write a general equation that summarizes your findings.

12. A ball rebounds to a height of 30.0 cm on the third bounce and to a height of 5.2 cm on the sixth bounce.

a. Write two different yet equivalent equations in point-ratio form, $y = y_1 \cdot b^{x-x_1}$, using r for the ratio. Let x represent the bounce number, and let y represent the rebound height in centimeters. ⓗ

b. Set the two equations equal to each other. Solve for r. ⓐ

c. What height was the ball dropped from? ⓗ

13. Solve.

a. $(x-3)^3 = 64$ b. $256^x = \frac{1}{16}$ c. $\frac{(x+5)^3}{(x+5)} = x^2 + 25$ ⓗ

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$((x-3)^3)^{1/3} = (64)^{1/3}$

$x - 3 = 4$

$+3 \quad +3$

$x = 7$

$3^x = \frac{1}{9}$

$3^x = \frac{1}{3^2} = 3^{-2}$

$x^a = x^b \Rightarrow a = b$

$x = -2$

$x^7 = 4000$

$(x^7)^{1/7} = (4000)^{1/7}$

$x^1 \approx 3.27$

~~7 − 6 = 1~~

$7 \div 7 = 1$

$7 \cdot \frac{1}{7} = 1$

$\frac{2}{3} \div \frac{4}{7} = \frac{2}{3} \cdot \frac{7}{4}$

mult by rec

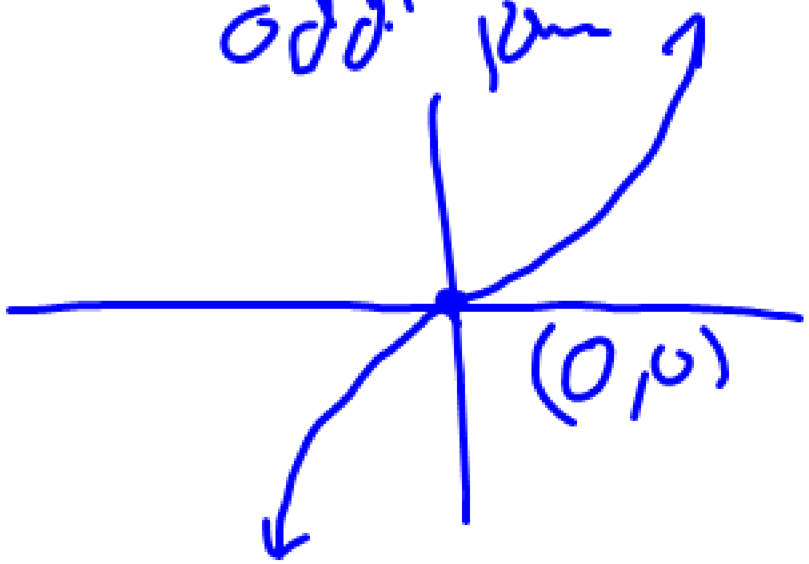
power function

$y = x^n$

variable (x) is the base

even power

odd power

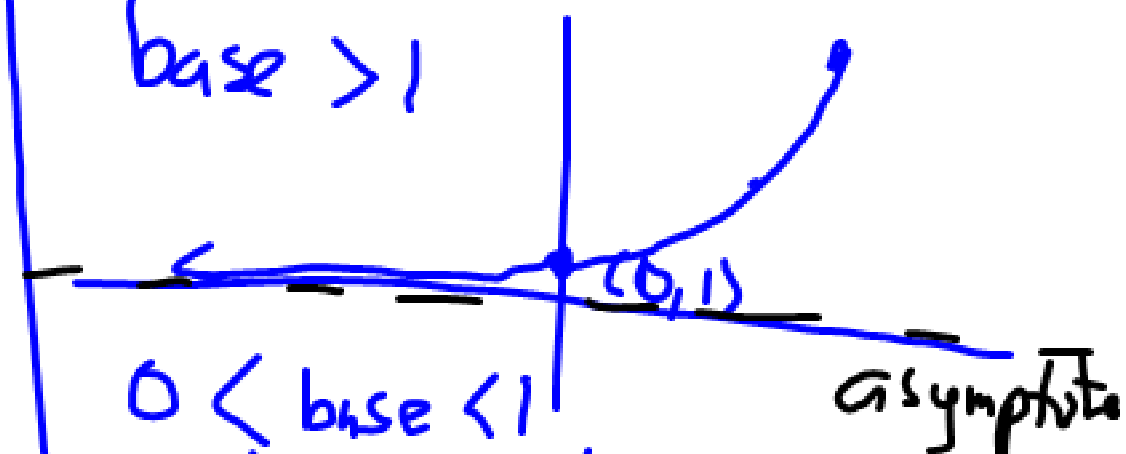


exponential function

$y = n^x$

variable (x) is the exponent

base > 1



0 < base < 1