

BE-Alg. 2 | MONDAY 3-28-11

Simplify:  USE EXPONENT RULES

① $x^5 x^3 x$

④ $\frac{x^3}{x^5}$

② $\frac{x^5}{x^3}$

⑤ x^{-5}

③ $\frac{x^5}{x^0}$

⑥ $\frac{1}{x^{-3}}$

⑦ $(a^4 b^3 c^2)^5$

⑧ $(x^7)^5$

⑨ $(16)^{\frac{3}{4}}$

• Memorize the 6 exponent rules

plus #7 $\Rightarrow$ FRACTIONAL EXPONENT RULE

$$a^{\frac{N}{m}} = \sqrt[m]{a^N} \text{ or } (\sqrt[m]{a})^N$$

EX $16^{\frac{3}{4}} = \sqrt[4]{16^3} \text{ or } (\sqrt[4]{16})^3$
 $= (2)^3 = \boxed{8}$

Ch. 10-1 Exponential Functions

EXPONENTIAL
Function

A function where the independent variable (x) is an exponent.

(EX) $y = a b^x$

b = base

a = constant, often called the "initial value" since when $x=0$, $y = a b^0 = a(1)$
 $y = a$

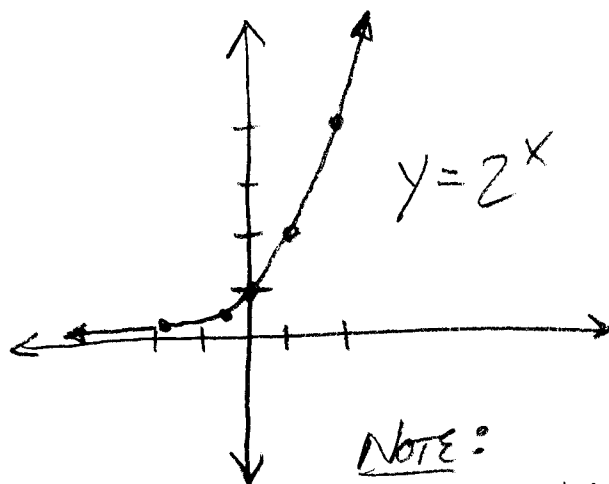
Ex 1
pg 523

$y = 2^x$

$\Rightarrow a = 1$
 $b = 2$

x	$y = 2^x$
-2	$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$
-1	$2^{-1} = \frac{1}{2}$
0	$2^0 = 1$
1	$2^1 = 2$
2	$2^2 = 4$
$-\infty$	Approaches asymptotically - never crosses 0
$+\infty$	keeps getting bigger, passes to right of any x eventually

Key
point



NOTE:

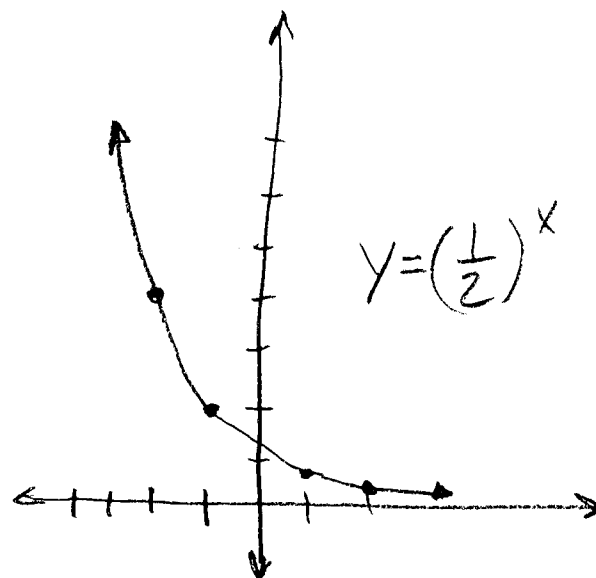
Domain: All reals
Range: $y > 0$

Ex $y = \left(\frac{1}{2}\right)^x$

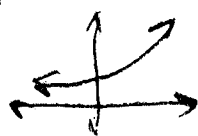
$a = 1$
 $b = \frac{1}{2}$

x	$\left(\frac{1}{2}\right)^x$
-2	$\left(\frac{1}{2}\right)^{-2} = \frac{1}{\left(\frac{1}{2}\right)^2} = \frac{1}{\frac{1}{4}} = 4$
-1	$\left(\frac{1}{2}\right)^{-1} = \frac{1}{\left(\frac{1}{2}\right)^1} = 2$
0	$\left(\frac{1}{2}\right)^0 = 1$
1	$\left(\frac{1}{2}\right)^1 = \frac{1}{2}$
2	$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$
$+\infty$	Approaches 0 Asymptotically
$-\infty$	Keep $\uparrow$, NOT ASYMPTOTE

Key
point
 $\downarrow$
y-intercept
 $\downarrow$
"initial"
value

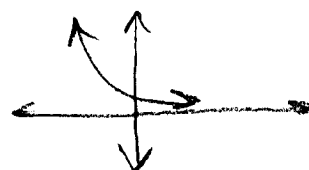


Exponential Functions:



EXPONENTIAL
GROWTH

$\text{Base} > 1$



EXPONENTIAL
DECAY

$0 < \text{Base} < 1$

- Base $\neq 1$, why? $y = 1^x = 1$ NOT EXPONENTIAL, just horizontal line
- Base $\neq$ Negative, why?
 - $(-b)^x$ even $\Rightarrow$ positive
 - $(-b)^x$ odd $\Rightarrow$ negative
 - Graph is "crazy" $\uparrow \downarrow$

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$$y = 2^{\sqrt{5}} \approx 2^{(2.2361)} \approx 4.7112$$

$\therefore 2^{\sqrt{5}} \approx 4.7$ is reasonable

DOMAIN: All reals Domain: All reals
 Range: All reals Range: $y > 0$

Ⓐ. $y = \left(\frac{1}{5}\right)^{x^0}$ $a = 1$ $b = \frac{1}{5}$

⑥ $y = 3(4)^x$ $a = 3$ $b = 4$

(c) $y = 7(1.2)^x$ $a = 7$ $b = 1.2$

Pg. 526 $\Rightarrow$

Property of Equality for Exponential Functions

for $b > 0$ except $b \neq 1$
 then $b^x = b^y$ iff $x = y$

Ex $2^x = 2^8 \quad x = 8 \quad \text{ck: } 2^8 = 2^8$

Ex $3^{x-2} = 27 \quad \text{ck } 3^{(\quad)-2} \stackrel{?}{=} 27$
 $3^{x-2} = 3^3$
 $\therefore x-2 = 3$
 $\boxed{x = 5}$
 $3^{(5)-2} \stackrel{?}{=} 27 \checkmark$

Ex 5 Pg 526 (A) $3^{2N+1} = 81 \quad \text{ck } 3^{2(\frac{3}{2})+1} \stackrel{?}{=} 91$
 $3^{2N+1} = 3^4$
 $\therefore 2N+1 = 4$
 $\boxed{N = \frac{3}{2}}$
 $3^4 \stackrel{?}{=} 81 \checkmark$

(b) $4^{2x} = 8^{x-1}$

$(2^2)^{2x} = (2^3)^{x-1} \quad \therefore 2^{4x} = 2^{3x-3}$

ck $4^{2(-3)} \stackrel{?}{=} 8^{(-3)-1}$

$4^{-6} = 8^{-4}$

$\frac{1}{4^6} = \frac{1}{8^4}$

$4^6 = 4096$
 $8^4 = 4096 \checkmark$

$4x = 3x - 3$

$\boxed{x = -3}$

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Homework:

Pg 527-528

2-10, 16, 18.
