DO NOW

Are arcsin x (or $\sin^{-1}x$) and csc x the same thing?

Inverse function of sin

multiplicative inverse of sin

1.6 Exponential and Logarithmic Functions

Properties of Exponents: a and b are positive real numbers and x and y are any real number.

1. $a^0 = 1$
2. $a^x a^y = a^{x+y}$
3. $(a^x)^y = a^{xy}$
4. $(ab)^x = a^x b^x$
5. $\frac{a^x}{a^y} = a^{x-y}$
6. $\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$
7. $a^{-x} = \frac{1}{a^x}$
8. $a^{\frac{x}{y}} = \sqrt[y]{a^x}$

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a. $(2^2)^3$
2^6
64

b. $(5^4)^{\frac{1}{2}}$
5^2
25

c. $\left[(27^{-1})(27^{2/3})\right]^3$
$(27^{-1/3})^3$
$27^{-1} = \frac{1}{27}$

d. $(25^{3/2})(3^2)$ ($\sqrt{25^3}$)
$(5^3)(3^2)$
$125(9) = 1125$

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$5^{x+1} = 125$
$5^{x+1} = 5^3$
$x+1 = 3$
$x = 2$

Exponential Function - involves a constant raised to a power. Ex: $f(x) = 2^x$

In general → $f(x) = a^x$ where $a > 1$.

* Variables as exponents

domain: $(-\infty, \infty)$
range: $(0, \infty)$
y - intercept: $(0,1)$

* one-to-one

* To sketch graphs - use calculator and table of values

The Number 'e'

- natural or convenient choice for a base of an exponential #
- base for natural logarithm
- irrational constant

$e \approx 2.71828182846\ldots$

* Often used in real world calculations and in calculus

The Natural Logarithm Function:

let x be a positive real number

$\ln x = b$ if and only if $e^b = x$

logarithmic form ↑ exponential form ↑

domain: $(0, \infty)$
range: $(-\infty, \infty)$
x-intercept: $(1,0)$
** one-to-one
** $f(x) = e^x$ and $g(x) = \ln x$ are inverses of each other
$\therefore \ln e^x = x$ and $e^{\ln x} = x$

pg 54; 16 Solve for x: $e^x = 1$

$x = 0$

Write the exponential equation as a logarithmic equation or vice versa.

42. $e^{-2} = .1353...$

$\ln e^{-2} = \ln .1353...$

$-2 = \ln .1353....$

44. $\ln .5 = -.6931...$

$e^{\ln .5} = e^{-.6931}$

$.5 = e^{-.6931}$

HOMEWORK

pg 54 - 55; 1 - 15 odd, 35 - 38, 41, 43