December 2

How is the process for solving the equations below similar or different?

$4x^2 - 8x = 0$ $\rightarrow 4x(x-2)=0$

$\frac{4x^2}{4} = \frac{8x}{4}$

$x^2 = 2x$

$x^2 - 2x = 0$

$x(x-2) = 0$

$x = 0 \quad x - 2 = 0$

$x = 2$

$4x^2 - 36 = 0$

$+36 \quad +36$

$\frac{4x^2}{4} = \frac{36}{4}$

$x^2 = 9$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

December 2

Students will verbally explain how to graph and simplify exponential function

(using the words:
product, sum, power...)

1. Evaluate each expression. Give your answer in radians, as a fraction in terms of $\pi$

(a) $\arccos\left(-\frac{\sqrt{3}}{2}\right)=$

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$0 \leq x < \pi$

one answer

(b) $\arcsin\left(\frac{\sqrt{2}}{2}\right)=$

(b) $\arcsin\left(-\frac{\sqrt{3}}{2}\right)$

$-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

(c) $\arctan\left(-\frac{1}{\sqrt{3}}\right)=$

(c) $\arctan\left(\sqrt{3}\right)=$

$-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

(d) $\cos^{-1}(-1)$

infinite # of answers

(d) $\sin^{-1}(-1)$

(d) $\sin x + \cos x(\sin x) = 0$

$-\sin x \qquad -\sin x$

$$\frac{\cos x(\sin x)}{\sin x} = \frac{-\sin x}{\sin x}$$

$\cos x = -1$

dividing by an unknown

$\sin x = 0$

(d) $\cos x + \sin x(\cos x) = 0$

$\cos x(1+\sin x)=0$

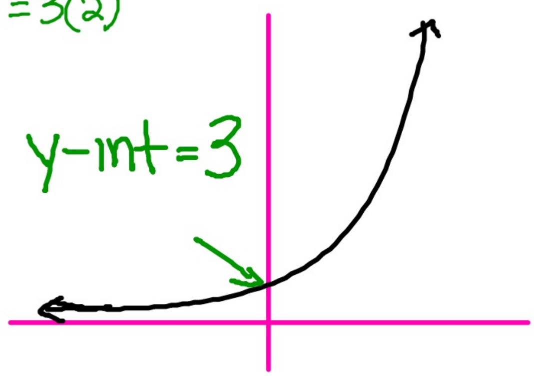
$\cos x = 0$

$1+\sin x = 0$

You start with 3 friends on Facebook. Every day you double your number of friends. How many friends will you have in 5 days?

| Day # | # of friends |
|---|---|
| 0 | 3 |
| 1 | $6 = 3(2)$ |
| 2 | $12 = 6(2) = 3(2)(2) = 3(2)^2$ |
| 3 | $24 = 12(2) = 3(2)(2)(2) = 3(2)^3$ |
| 4 | 48 |
| 5 | $96 = 2^5(3)$ |

$y = 3(2)^x$




Properties of exponential functions

$y = a(b)^x \qquad b > 1$

→ exponential function because the independant variable is an exponent

→ pass the horizontal + vertical line test ⟹ has an inverse function

→ y-intercept is at $(0, a)$

→ there is no x-intercept

→ the graph never crosses the x-axis

→ the function never equals zero

$a(b)^x \neq 0$

→ as x decreases (x approaches $-\infty$) the value of the function approaches zero

⟹ horizontal asymptote at $y=0$

Simplification Properties

$b^x \cdot b^y = b^{x+y}$

$\frac{b^x}{b^y} = b^{x-y}$

$(b^x)^y = b^{xy}$

$b^0 = 1$ $(b \neq 0)$

$b^{-x} = \frac{1}{b^x}$

$\frac{1}{b^{-x}} = b^x$

$(ab)^x = a^x b^x$

$\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$

$\boxed{\cancel{(a+b)^x = a^x + b^x}}$

Rewrite

$5^x 5^3$ | $5^{x+3}$

$\underbrace{5 \cdot 5 \cdot 5 \cdot 5 \cdots 5}_{x\text{-times}} \cdot \underbrace{5 \cdot 5 \cdot 5}_{3 \text{ more}}$

$7q^{-10}$ | $7\left(\frac{1}{q^{10}}\right) = \frac{7}{q^{10}}$

$(4c)^{-3}$ | $= \frac{1}{(4c)^3} = \frac{1}{4^3 c^3}$

$9^{x-(y+5)}$ | $\frac{9^x}{9^{y+5}} = \frac{9^x}{9^y 9^5}$

Rewrite

$5^x 5^7$ | $5^{x+7}$

$3q^{-10}$ | $3\left(\frac{1}{q^{10}}\right) = \frac{3}{q^{10}}$

$(3c)^{-4}$ | $3^{-4} c^{-4} = \frac{1}{3^4} \cdot \frac{1}{c^4} = \frac{1}{3^4 c^4} = \frac{1}{81 c^4}$

$8^{x-(y+5)}$ | $\frac{8^x}{8^{y+5}} = \frac{8^x}{8^y 8^5}$

(rewrite using only multiplication + division)