Graph of Equations

Set Notation

Roster Notation: $A = \{a, b, c\}$ or $A = \{a, b, c, ..., z\}$
Set Builder Notation: $A = \{\ x \mid x$ is a lowercase character in the Latin alphabet $\}$

Terminology and implications

Given sets...

$$A = \{a, b, c\}$$
$$B = \{a, b, c, ..., z\}$$
$$C = \{a, e, i, o, u\}$$
$$D = \{a, i, u, e, o\}$$
$$E = \{a, e, i\}$$

We know

$a \in A$	a is an element of A
$e \notin A$	e is not an element of A
$A \notin A$	A set cannot be an element of a set
$\emptyset = \{\}$	
$U =$ All elements of interest	
$C = D$	
$C \neq E$	
$E \subset C$	E is a proper subset of C
$E \subseteq C$	E is a subset of C
$A \cup E = \{a, b, c, e, i\}$	A union E equals everything in A or E
$A \cap E = \{a\}$	A join E equals everything in A and E
$A^c = \{d, e, f, ..., z\}$	The compliment of A is all elements in the universal set and not in A

Laws and Properties

Commutative

$$A \cup B = B \cup A$$
$$A \cap B = B \cap A$$

Associative

$$A \cup (B \cup C) = (A \cup B) \cup C$$
$$A \cap (B \cap C) = (A \cap B) \cap C$$

Distributive

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$
$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

De Morgans Laws

$$(A \cup B)^c = A^c \cap B^c$$
$$(A \cap B)^c = A^c \cup B^c$$

Combinatorics

$$\begin{aligned} n(S) &= \text{Number of unique items in set S} \\ n(A \cup B) &= n(A) + n(B) - n(A \cap B) \\ n(A \cup B \cup C) &= n(A) + n(B) + n(C) \\ &\quad - n(A \cap B) - n(A \cap C) \\ &\quad - n(B \cap C) + n(A \cap B \cap C) \end{aligned}$$

Graphing Trigonometric Functions

Assume...

$y = d + a * f(bx - c)$
Amplitude $= |a|$
Vertical Shift $= d$
Phase Shift $= \frac{c}{b}$
X-Scale (change between critical points) $= \frac{\text{period}}{4}$

Period depends on what functions

sin, cos, csc, sec $= \frac{2\pi}{b}$
tan, cot $= \frac{\pi}{b}$

Examples...