2/29/16 1

6. a) $\neg p \vee q \equiv p \Rightarrow q$ or $\neg p \vee q \equiv \neg q \Rightarrow \neg p$

p	q	$\neg p$	$q \vee \neg p$ / $\neg p \vee q$	$p \Rightarrow q$	$\neg q$	$\neg p$	$\neg q \Rightarrow \neg p$
T	T	F	T	T	F	F	T
T	F	F	F	F	T	F	F
F	T	T	T	T	F	T	T
F	F	T	T	T	T	T	T

Same

Same

b) $p \vee (p \wedge q) \equiv p$ or $p \wedge (p \vee q) \equiv p$

p	q	$p \wedge q$	$p \vee (p \wedge q)$	$p \vee q$	$p \wedge (p \vee q)$
T	T	T	T	T	T
T	F	F	T	T	T
F	T	F	F	T	F
F	F	F	F	F	F

Same

Same

Write out (Modus Ponens/Modus Tollens) ②.
symbollically. State the conditions for an argument to be valid and prove (Modus Ponens/Modus Tollens) is a valid argument.
Can you give an example of how (Modus Ponens/Modus Tollens) is used?

<u>M.P.</u>: $(p \wedge (p \Rightarrow q)) \Rightarrow q$.

<u>M.T.</u>: $(\neg q \wedge (p \Rightarrow q)) \Rightarrow \neg p$.

To be valid, these statements must be Tautologies $(P_1 \wedge P_2 \wedge P_3 \wedge \dots \wedge P_n \Rightarrow C)$

p	q	$p \Rightarrow q$	$p \wedge (p \Rightarrow q)$	$(p \wedge (p \Rightarrow q)) \Rightarrow q$ M.P.
T	T	T	T	T
T	F	F	F	T
F	T	T	F	T
F	F	T	F	T

If it's Monday, then we meet for Math 170 today

It is Monday.

Therefore we meet for Math 170 today.

p	q	$\neg p$	$p \Rightarrow q$	$\neg q$	$(p \Rightarrow q) \wedge \neg q$	$((p \Rightarrow q) \wedge \neg q) \Rightarrow \neg p$
T	T	F	T	F	F	T
T	F	F	F	T	F	T
F	T	T	T	F	F	T
F	F	T	T	T	T	T

If it's Monday, then we meet for Math 170 today.

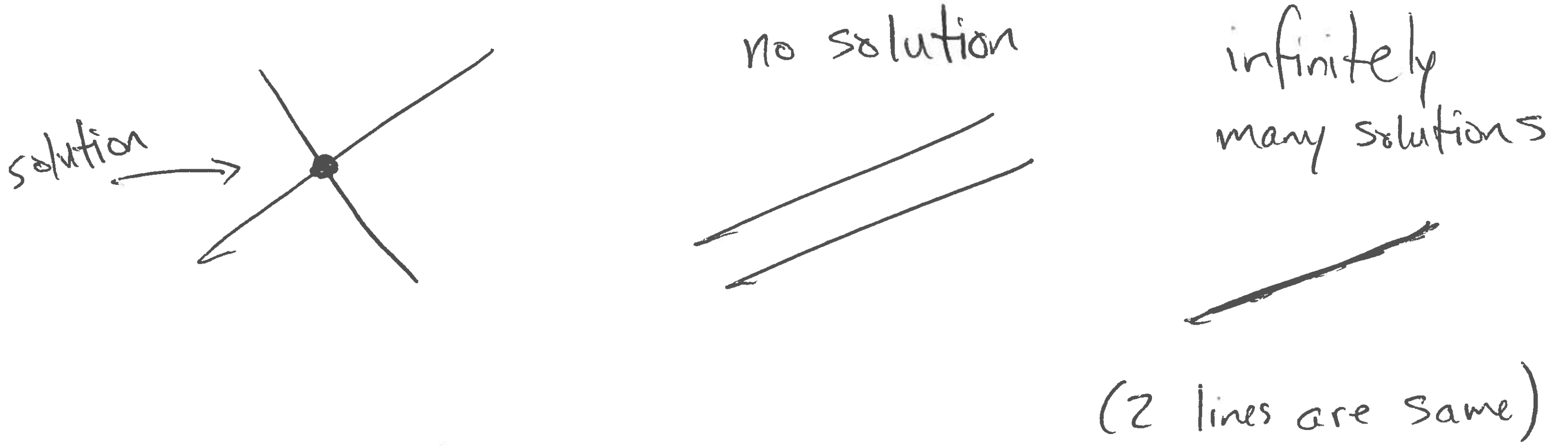
We do not meet for Math 170 today.

Therefore it is not Monday.

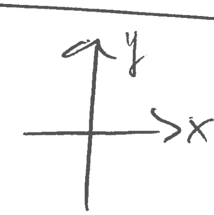
Recall: A 2×2 system is a pair of lines

$$a_1 x + b_1 y = c_1 \qquad a_i, b_i \text{ not all zero.}$$
$$a_2 x + b_2 y = c_2$$

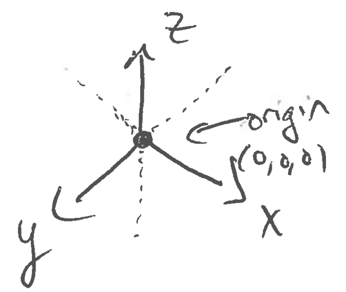
Solutions to such a system are points on both of the graphs. Three possible situations:



$\mathbb{R}^2$ - Cartesian Plane / x,y-plane



$\mathbb{R}^3$ - 3-space

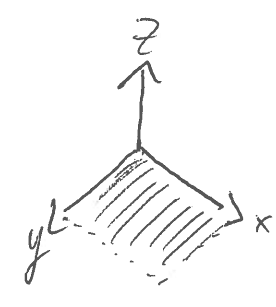


$$\mathbb{R}^3 = \mathbb{R}\times\mathbb{R}\times\mathbb{R}$$
$$= \{(x,y,z) \mid x,y,z \in \mathbb{R}\}$$

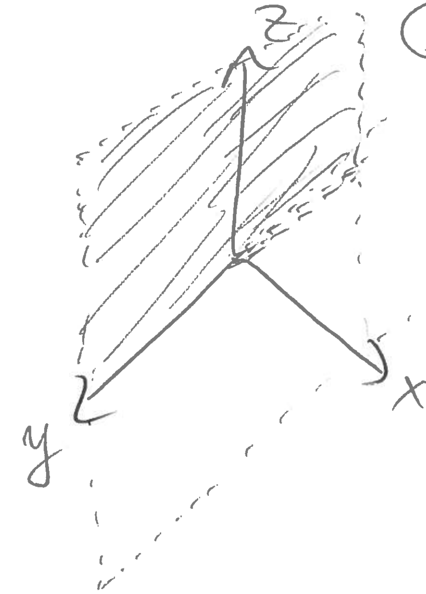
Eg: $z=0$

Graph of $z=0$ is the set

$$\{(x,y,0) \mid x,y \in \mathbb{R}\}$$



E.g.: $x = 0$



$$\{(0, y, z) \mid y, z \in \mathbb{R}\}$$