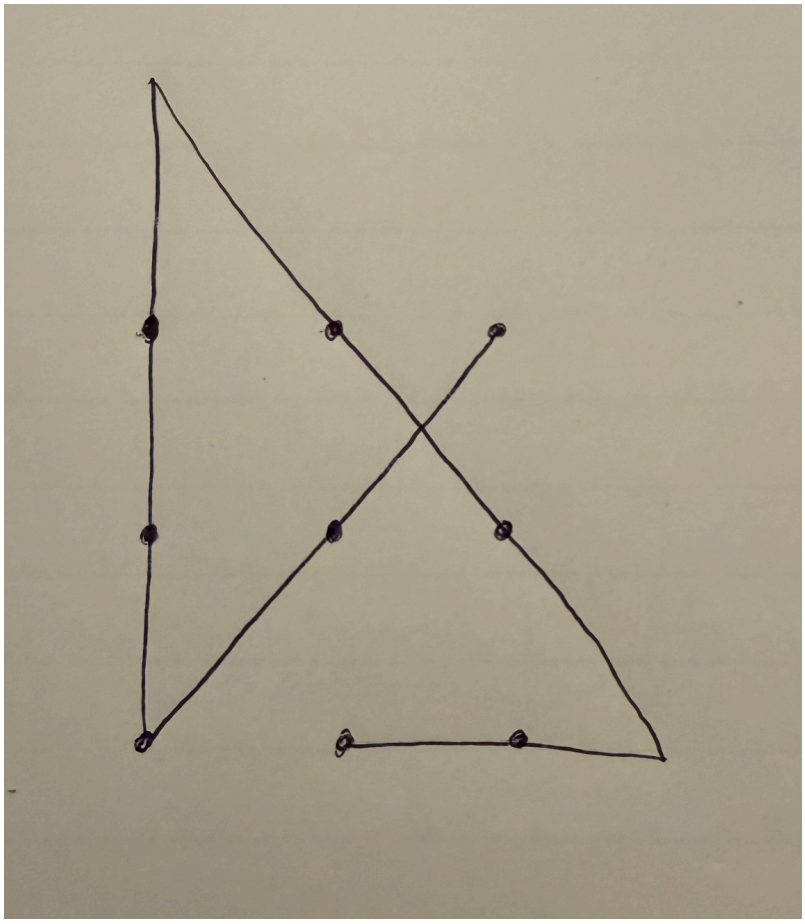
Lawrence Benitez, Owen Dewing, Leo Dai
CMSI 627
HW #1

Ch 1, #3:

a.



b. In order to keep the lines straight and not cross through one dot more than once, it is necessary to expand beyond the 3x3 area. However, most people would assume that the lines would have to stay within the square. An expert system would not perform very well on this problem because it relies on stated rules/constraints, and the solution to this problem involves thinking beyond the given rules.

Ch 1, #5:

IF fire type is oil
THEN use foam extinguisher and do not use water
IF fire type is electrical
THEN cut power source and use CO_2 extinguisher
IF fire type is chemical
THEN use dry chemical extinguisher and wear protective gear

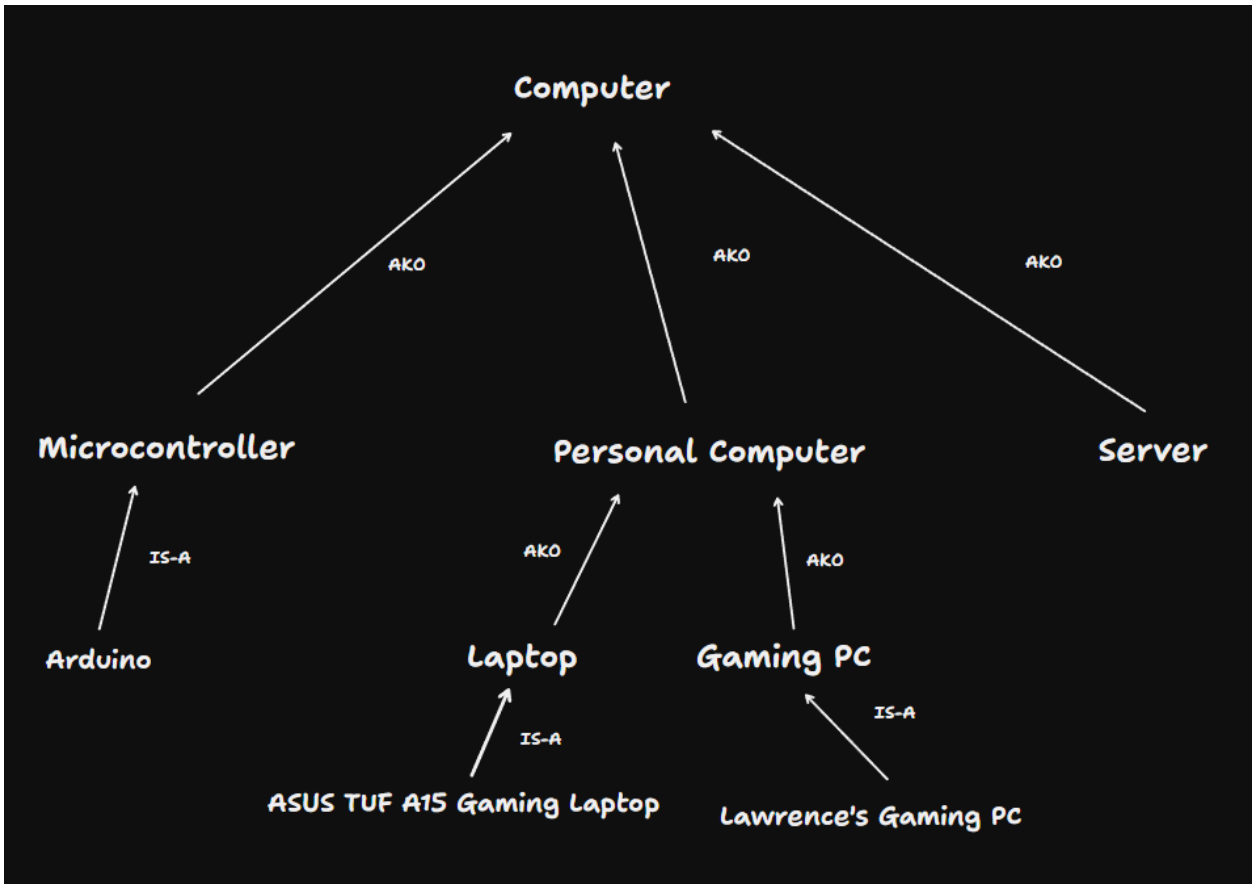
IF fire type is wood
THEN use water or Class A extinguisher
IF fire type is metal
THEN use Class D extinguisher and avoid water

Ch 1, #7:
IF budget is limited
THEN choose domestic travel
IF vacation time is short
THEN choose a nearby destination
IF traveling with children
THEN prioritize safety and kid-friendly activities
IF goal is relaxation
THEN avoid crowded tourist destinations
IF traveling during peak season
THEN book accommodations early
IF weather is a priority
THEN choose destination based on climate averages
IF traveling alone
THEN prioritize public transportation access
IF food is important
THEN research local cuisine beforehand
IF language barrier is a concern
THEN choose English-speaking destinations
IF travel cost increases
THEN reduce trip duration

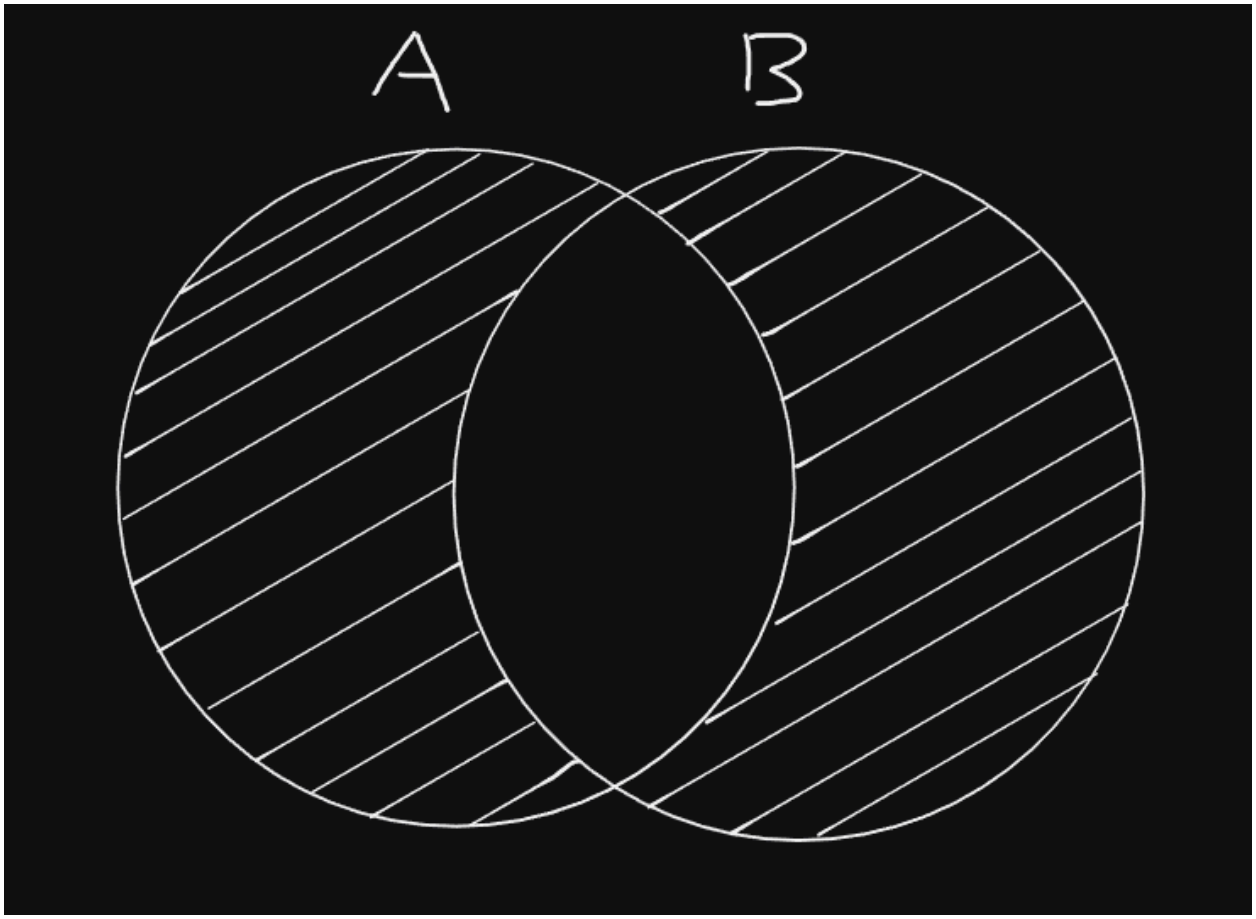
Ch 1, #12:
IF forgot
THEN pretend it didn't show on brightspace
IF submission didn't go through
THEN submit properly and explain technical difficulty
IF was sick
THEN tell instructor about illness
IF personal emergency
THEN ask instructor for extension
IF multiple deadlines overlapped
THEN explain and ask for extension
IF didn't have access to internet
THEN submit ASAP and explain circumstances

IF assignment only partially complete
THEN ask for partial credit
IF instructions were unclear
THEN ask for clarification
IF didn't feel like it
THEN dog ate it
IF can still get A without doing it
THEN no further action required

Ch 2, #1:

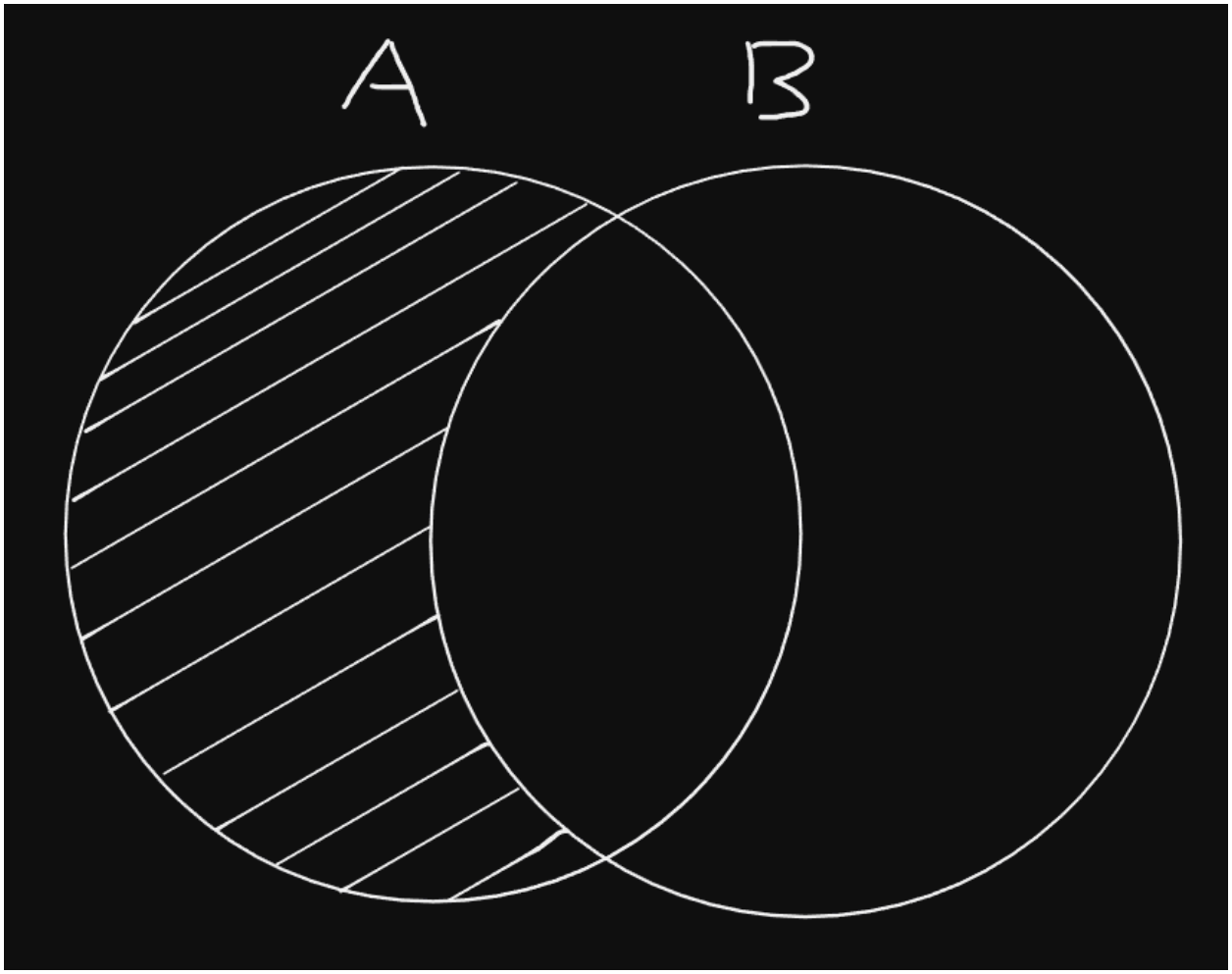


Ch 2, #5a:



A/B

Ch 2, #5b:



A—B

Ch 2, #7:

1. If you eat a banana split, then you cannot eat a pie.
2. If you eat a pie, then you cannot eat a banana split.

B: you eat a banana split

P: you eat a pie

1. B -> ¬P
2. P -> ¬B

Biconditional statement: B -> ¬P ↔ P -> ¬B

B	P	B -> ¬P	P -> ¬B
T	T	F	F

T	F	T	T
F	T	T	T
F	F	T	T

True in every case, thus the biconditional statement (B -> ¬P ↔ P -> ¬B) is a tautology

Ch 2, #13a:

P	Q	P ∨ Q	¬(P∨Q)	P ∧ Q	¬(P∧Q)
T	T	T	F	T	F
T	F	T	F	F	T
F	T	T	F	F	T
F	F	F	T	F	T

Ch 2, #13b:
∼∼P ≡ P

∼∼P	P
T	T
F	F

(P ∧ Q) ≡ (P ↓ P) ↓ (Q ↓ Q)

P	Q	P ↓ P	Q ↓ Q	(P ↓ P) ↓ (Q ↓ Q)	P ∧ Q
T	T	F	F	T	T
T	F	F	T	F	F
F	T	T	F	F	F
F	F	T	T	F	F

$\sim P \equiv P \mid P$

$\sim P$	$P \mid P$
T	T
F	F

$(P \vee Q) \equiv (P \vee P) \vee (Q \vee Q)$

P	Q	$P \vee P$	$Q \vee Q$	$(P \vee P) \vee (Q \vee Q)$	$P \vee Q$
T	T	T	T	T	T
T	F	T	F	T	T
F	T	F	T	T	T
F	F	F	F	F	F

Ch 2, #13c:
$P \rightarrow Q \equiv \sim((P \downarrow P) \downarrow (\sim Q \downarrow \sim Q))$

Ch 2, #13d:
The advantage of using adequate singleton sets in terms of notation is that only one operator is needed and that logical systems are simpler and more uniform. The disadvantage is that expressions become longer and harder to read and they are less intuitive than the standard operators.
The advantage of using adequate singleton sets in terms of electronic circuit construction is that NAND and NOR gates are fast, reliable, and universal. The disadvantage is that more gates may be required for complex logic and increased circuit depth can create propagation delays.