1.

a) Randy Goldberg is enrolled in the class CS 252.

b) There is a class in which Carol Sitea is enrolled.

c) There is a student who is enrolled in both Math 222 and CS 252.

d) There is a student that is not Mary Black that is enrolled in all the classes which Mary Black is enrolled in.

2. a)

Domain for x: all students in this class

Domain for y: all countries in the world

Predicate: V(x,y) : "x has visited y"

Statement A: $\mathbf{\exists x \forall y V(x,y)}$

Negation:

$\neg(\exists x \forall y V(x,y))$

$\equiv \neg\exists x \forall y V(x,y)$

$\equiv \forall x \neg\forall y V(x,y)$

$\equiv \mathbf{\forall x \exists y\ \neg V(x,y)}$

In English: Everyone in this class has not visited some country in the world.

b)

Domain for x: all people

Domain for y: all mountains in the Himalayas

Predicate: $C(x,y)$: "x climbed y"

Statement B: $\boldsymbol{\forall x \exists y \neg C(x,y)}$

Negation:

$\neg(\forall x \exists y \neg C(x,y))$

$\equiv \neg\forall x \exists y \neg C(x,y)$

$\equiv \exists x \neg\exists y \neg C(x,y)$

$\equiv \exists x \forall y \neg(\neg C(x,y))$

$\equiv \boldsymbol{\exists x \forall y C(x,y)}$

In English: There is someone that has climbed every mountain in the Himalayas.

c)

Domain for x: all faculty members at my school

Domain for y: all children from Berekuso Basic School

Predicate: $M(x,y)$: "x mentored y"

Statement C: $\boldsymbol{\forall x \exists y M(x,y)}$

Negation:

$\neg(\forall x \exists y M(x,y))$

$\equiv \neg\forall x \exists y M(x,y)$

$\equiv \exists x \neg\exists y M(x,y)$

$\equiv \exists x \forall y \neg(M(x,y))$

$\equiv \boldsymbol{\exists x \forall y \neg M(x,y)}$

In English: There is a faculty member who has not mentored all children from Berekuso Basic School.

3.

Let P: “Maria is cooking.”

Q: “Maria is hungry.”

R: “Maria will go jogging.”

$\neg P \vee Q$

$Q \rightarrow \neg R$

$P \vee \neg R$

$\therefore \neg R$

	Step	Reason
1.	$\neg P \vee Q$	Premise
2	$Q \rightarrow \neg R$	Premise
3.	$P \vee \neg R$	Premise
4.	$\neg Q \vee \neg R$	Conditional disjunction equivalence on 2
5.	$(P \vee \neg R) \wedge (\neg P \vee Q)$	Conjunction on 3 and 1
6.	$(\neg R \vee Q)$	Resolution on 5
7.	$(Q \vee \neg R)$	1st Commutativity Law on 6
8.	$(Q \vee \neg R) \wedge (\neg Q \vee \neg R)$	Conjunction on 7 and 4
9.	$(Q \vee \neg Q) \wedge \neg R$	2nd distributive law on 8
10.	$T \wedge \neg R$	1st Negation Law on 9
11	$\neg R$	1st Identity Law on 10

∴ The premises imply the conclusion "Maria will not go jogging."