

Ricardo Barbosa

CST 329

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Please read Chapter 13 of our textbook, A Concise Introduction to Logic. Then, prove all hw11 repository problems at proof-checker.org. They are titled hw11.1, hw11.2, ..., hw11.8.

A record of your proof will automatically be stored when you get successful proof. You can load those proofs later.

Paste the screenshots of your successful proofs in a document with proper labels (e.g., hw11.2 above the screenshot image). Write your name on top of the document. Then create a single pdf of that document and submit it here.

Please remember that you are not to work with others in any way on your proofs.

Feel free to ask the instructor or TA for hints if you get stuck. Start early!


11.1


Check Your Proof:


Proof: Repository - hw11.1

Construct a proof for the argument: $\forall x(Gx \rightarrow Hx), Ga \wedge Gb \therefore Ha \wedge Hb$

| | | |
|---|--------------------------------|---------------------------|
| 1 | $\forall x(Gx \rightarrow Hx)$ | |
| 2 | $Ga \wedge Gb$ | |
| 3 | $Ga \rightarrow Ha$ | 1 Universal instantiation |
| 4 | Ga | 2 Simplification |
| 5 | Ha | 3, 4 Modus Ponens |
| 6 | Gb | 2 Simplification |
| 7 | $Gb \rightarrow Hb$ | 1 Universal instantiation |
| 8 | Hb | 6, 7 Modus Ponens |
| 9 | $Ha \wedge Hb$ | 5, 8 Adjunction |

 new line

 new subproof

 Congratulations! This proof is correct.

check proof

start over

Clear & Start a new Proof

Check Your Proof:

Proof: Repository - hw11.2

Construct a proof for the argument: $\forall x(Hx \leftrightarrow Fx), \neg Fc \therefore \neg Hc$

| | | |
|---|------------------------------------|---------------------------|
| 1 | $\forall x(Hx \leftrightarrow Fx)$ | |
| 2 | $\neg Fc$ | |
| 3 | $Hc \leftrightarrow Fc$ | 1 Universal instantiation |
| 4 | $\neg \neg Hc$ | |
| 5 | Hc | 4 Double Negation |
| 6 | Fc | 3, 5 Equivalence |
| 7 | $\neg Fc$ | 2 Repeat |
| 8 | $\neg Hc$ | 4-7 Reductio Ad Absurdum |

 new line

 new subproof

😊 Congratulations! This proof is correct.

check proof

start over

Clear & Start a new Proof


Check Your Proof:

Proof: Repository - hw11.3

Construct a proof for the argument: $\forall x(Fx \leftrightarrow Gx), Gd \therefore \exists x(Gx \wedge Fx)$

| | | |
|---|------------------------------------|------------------------------|
| 1 | $\forall x(Fx \leftrightarrow Gx)$ | |
| 2 | Gd | |
| 3 | $Fd \leftrightarrow Gd$ | 1 Universal instantiation |
| 4 | Fd | 2, 3 Equivalence |
| 5 | $Gd \wedge Fd$ | 2, 4 Adjunction |
| 6 | $\exists x(Gx \wedge Fx)$ | 5 Existential generalization |

 new line

 new subproof

😊 Congratulations! This proof is correct.

check proof

start over

Clear & Start a new Proof

Check Your Proof:


Proof: Repository - hw11.4

Construct a proof for the argument: $\neg(Fa \wedge Ga) \therefore \exists x(\neg Fx \vee \neg Gx)$

| | | |
|----|---------------------------------------|-------------------------------|
| 1 | $\neg(Fa \wedge Ga)$ | |
| 2 | $\neg\exists x(\neg Fx \vee \neg Gx)$ | |
| 3 | $\neg\neg Ga$ | |
| 4 | Ga | 3 Double Negation |
| 5 | $Fa \vee Ga$ | 4 Addition |
| 6 | $\neg\neg Fa$ | |
| 7 | Fa | 6 Double Negation |
| 8 | $Fa \wedge Ga$ | 4, 7 Adjunction |
| 9 | $\neg(Fa \wedge Ga)$ | 1 Repeat |
| 10 | $\neg Fa$ | 6–9 Reductio Ad Absurdum |
| 11 | $\neg Fa \vee \neg Ga$ | 10 Addition |
| 12 | $\exists x(\neg Fx \vee \neg Gx)$ | 11 Existential generalization |
| 13 | $\neg\exists x(\neg Fx \vee \neg Gx)$ | 2 Repeat |
| 14 | $\neg Ga$ | 3–13 Reductio Ad Absurdum |
| 15 | $\neg Fa \vee \neg Ga$ | 14 Addition |
| 16 | $\exists x(\neg Fx \vee \neg Gx)$ | 15 Existential generalization |
| 17 | $\neg\exists x(\neg Fx \vee \neg Gx)$ | 2 Repeat |
| 18 | $\exists x(\neg Fx \vee \neg Gx)$ | 2–17 Reductio Ad Absurdum |

 new line

 new subproof

 Congratulations! This proof is correct.

[check proof](#)

[start over](#)

Check Your Proof:


Proof: Repository - hw11.5

Construct a proof for the argument: $\exists x \neg(Fx \wedge Gx) \therefore \exists x(\neg Fx \vee \neg Gx)$

| | | |
|----|-----------------------------------|-----------------------------------|
| 1 | $\exists x \neg(Fx \wedge Gx)$ | |
| 2 | $\neg(Fa \wedge Ga)$ | |
| 3 | $\neg(\neg Fa \vee \neg Ga)$ | |
| 4 | $\neg Fa$ | |
| 5 | $\neg Fa \vee \neg Ga$ | 4 Addition |
| 6 | $\neg(\neg Fa \vee \neg Ga)$ | 3 Repeat |
| 7 | Fa | 4-6 Reductio Ad Absurdum |
| 8 | $\neg Ga$ | |
| 9 | $\neg Fa \vee \neg Ga$ | 8 Addition |
| 10 | $\neg(\neg Fa \vee \neg Ga)$ | 3 Repeat |
| 11 | Ga | 8-10 Reductio Ad Absurdum |
| 12 | $Fa \wedge Ga$ | 7, 11 Adjunction |
| 13 | $\neg(Fa \wedge Ga)$ | 2 Repeat |
| 14 | $\neg Fa \vee \neg Ga$ | 3-13 Reductio Ad Absurdum |
| 15 | $\exists x(\neg Fx \vee \neg Gx)$ | 14 Existential generalization |
| 16 | $\exists x \neg(Fx \wedge Gx)$ | 2 Existential generalization |
| 17 | $\exists x(\neg Fx \vee \neg Gx)$ | 1, 2-15 Existential instantiation |

 new line

 new subproof

 Congratulations! This proof is correct.

check proof


start over


Check Your Proof:

Proof: Repository - hw11.6

Construct a proof for the argument: $\therefore \forall x(Fx \rightarrow Gx) \rightarrow (\exists xFx \rightarrow \exists xGx)$

| | | |
|---|--|----------------------------------|
| 1 | $\forall x(Fx \rightarrow Gx)$ | |
| 2 | $Fa \rightarrow Ga$ | 1 Universal instantiation |
| 3 | $\exists xFx$ | |
| 4 | Fa | |
| 5 | Ga | 2, 4 Modus Ponens |
| 6 | $\exists xGx$ | 5 Existential generalization |
| 7 | $\exists xGx$ | 3, 4-6 Existential instantiation |
| 8 | $\exists xFx \rightarrow \exists xGx$ | 3-7 Conditional derivation |
| 9 | $\forall x(Fx \rightarrow Gx) \rightarrow (\exists xFx \rightarrow \exists xGx)$ | 1-8 Conditional derivation |

 new line

 new subproof

😊 Congratulations! This proof is correct.

[check proof](#)

[start over](#)

[Clear & Start a new Proof](#)


Check Your Proof:

Proof: Repository - hw11.7

Construct a proof for the argument: $\forall x \forall y Fxy \therefore \exists x Fxx$

| | | |
|---|---------------------------|------------------------------|
| 1 | $\forall x \forall y Fxy$ | |
| 2 | $\forall y Fay$ | 1 Universal instantiation |
| 3 | Faa | 2 Universal instantiation |
| 4 | $\exists x Fxx$ | 3 Existential generalization |

 new line

 new subproof

😊 Congratulations! This proof is correct.

check proof

start over

Clear & Start a new Proof

Check Your Proof:

Proof: Repository - hw11.8

Construct a proof for the argument: $\forall x Fxx \therefore \exists x \exists y Fxy$

| | | |
|---|---------------------------|----------------------------------|
| 1 | $\forall x Fxx$ | |
| 2 | Faa | 1 Universal instantiation |
| 3 | $\exists x Fxa$ | 2 Existential generalization |
| 4 | Fba | |
| 5 | $\exists y Fby$ | 4 Existential generalization |
| 6 | $\exists x \exists y Fxy$ | 5 Existential generalization |
| 7 | $\exists x \exists y Fxy$ | 3, 4-6 Existential instantiation |

 new line

 new subproof

😊 Congratulations! This proof is correct.

check proof

start over

Clear & Start a new Proof