This print-out should have 18 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 (part 1 of 4) 10.0 points

Consider the statement

If you are not taking this exam, then you are in this class.

Which of the following is its inverse?

1. If you are not in this class, then you are taking this exam.

2. If you are taking this exam, then you are not in this class. **correct**

3. You are taking this exam or are in this class.

4. If you are in this class, then you are not taking this exam.

5. You are not taking this exam and are not in this class.

Explanation:

002 (part 2 of 4) 10.0 points

Which of the following is its converse?

1. If you are in this class, then you are not taking this exam. **correct**

2. You are not taking this exam and are not in this class.

3. If you are taking this exam, then you are not in this class.

4. You are taking this exam or are in this class.

5. If you are not in this class, then you are taking this exam.

Explanation:

003 (part 3 of 4) 10.0 points

Which of the following is its contrapositive?

1. If you are taking this exam, then you are not in this class.

2. If you are in this class, then you are not taking this exam.

3. You are not taking this exam and are not in this class.

4. If you are not in this class, then you are taking this exam. **correct**

5. You are taking this exam or are in this class.

Explanation:

004 (part 4 of 4) 10.0 points

Which of the following is its negation?

1. If you are not in this class, then you are taking this exam.

2. You are taking this exam or are in this class.

3. If you are taking this exam, then you are not in this class.

4. If you are in this class, then you are not taking this exam.

5. You are not taking this exam and are not in this class. **correct**

Explanation:

005 10.0 points

To disprove $p \to q$, it suffices to prove . . .

1. the converse.

2. the inverse.

3. none of the other answers. **correct**

4. the contrapositive.

Explanation:

006 10.0 points

Suppose that p and q are statement forms such that $p \to \sim q$ is a tautology. Which of the following cannot be true?

1. $\sim p \wedge q$

2. $\sim q \to p$

3. $q \to p$

4. $p \wedge q$ **correct**

Explanation:

007 10.0 points

Which of the following is the converse of $\forall x(p(x) \to q(x))$?

1. $\forall x(\sim q(x) \to \sim p(x))$

2. $\exists x(q(x) \to p(x))$

3. $\exists x(\sim q(x) \to \sim p(x))$

4. $\forall x(q(x) \to p(x))$ **correct**

Explanation:

008 10.0 points

Consider the following argument:

If there is no moon, then there are no tides. There is no moon. Therefore, there are no tides.

This argument is:

1. invalid.

2. valid but unsound. **correct**

3. sound.

Explanation:

009 10.0 points

Consider the following argument:

If there is a moon, then the Earth is the third planet from the sun. There is a moon. Therefore, the Earth is the third planet from the sun.

This argument is:

1. invalid.

2. sound.

3. valid but unsound. **correct**

Explanation:

010 10.0 points

Consider the premises $p \to q$ and $p \vee r$. Which of the following conclusions can be added to these premises to form a valid argument?

1. $\sim q \to p$

2. $q \to p$

3. $\sim q \to r$ **correct**

4. $q \to r$

Explanation:

011 (part 1 of 2) 10.0 points

You are on the island of Knights and Knaves, where, as usual, knights always tell the truth and knaves always lie. Two islanders A and B approach you. Only A speaks, saying "We are both knaves." What are A and B?

1. Both are knights.

2. Both are knaves.

3. Not enough information is given.

4. A is a knave, B is a knight. **correct**

5. A is a knight, B is a knave.

Explanation:

012 (part 2 of 2) 10.0 points

Two more islanders C and D approach you. Only C speaks, saying "We are both knights." What are C and D?

1. C is a knight, D is a knave.

2. Both are knaves.

3. Not enough information is given. **correct**

4. Both are knights.

5. C is a knave, D is a knight.

Explanation:

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013 (part 1 of 4) 10.0 points

On which of the sets Z^+, Q^+, and R^+ (the positive integers, positive rational numbers, and positive reals, respectively) are the following statements true?

$$\forall x \in D \forall y \in D \exists z \in D (xz = y)$$

1. none

2. Z^+ and R^+ only

3. Z^+ and Q^+ only

4. all three

5. R^+ only

6. Q^+ only

7. Z^+ only

8. Q^+ and R^+ only **correct**

Explanation:

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014 (part 2 of 4) 10.0 points

$$\forall x \in D \forall y \in D (x < y \to \exists z \in D ((x < z) \wedge (z < y)))$$

1. R^+ only

2. Z^+ and R^+ only

3. Q^+ only

4. all three

5. none

6. Z^+ only

7. Z^+ and Q^+ only

8. Q^+ and R^+ only **correct**

Explanation:

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015 (part 3 of 4) 10.0 points

$$\forall x \in D \exists z \in D \forall y \in D (x < y \to ((x < z) \wedge (z < y)))$$

1. Z^+ only

2. Z^+ and R^+ only

3. R^+ only

4. none **correct**

5. Q^+ and R^+ only

6. Q^+ only

7. all three

8. Z^+ and Q^+ only

Explanation:

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016 (part 4 of 4) 10.0 points

$$\forall x \in D \exists y \in D \forall z \in D \\ (x < y \wedge ((z > x) \wedge (z \neq y) \to z > y))$$

1. Z^+ and Q^+ only

2. Z^+ only **correct**

3. Q^+ only

4. all three

5. none

6. Q^+ and R^+ only

7. Z^+ and R^+ only

8. R^+ only

Explanation:

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017 10.0 points

Which of the following statements defines what it means for n to be a prime number?

A:

$$(n > 1) \wedge \forall x \in Z^+ \forall y \in Z^+ \\ (xy = n \to (x = 1 \wedge y = n) \vee (x = n \wedge y = 1))$$

B:

$$(n > 1) \wedge \forall x \in Z^+ \forall y \in Z^+ \\ (xy = n \wedge (x \neq 1 \vee y \neq n) \to x = n \wedge y = 1)$$

1. A and B **correct**

2. neither

3. B only

4. A only

Explanation:

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018 10.0 points

For how many distinct positive integers n is the following statement true?

$$\forall x \in Z^+ \forall y \in Z^+ \\ ((xy = n \wedge x > 1 \wedge y > 1) \to x = y)$$

1. infinitely many **correct**

2. none

3. one

4. finitely many, more than one

Explanation: