
1. (4 points) Library/SDSU/Discrete/Predicates/negateB1.pg

Consider the following statement:

Everyone likes playing games.

For the following questions,

Let $X = \{people\}$

$P(x)$ be the predicate x likes playing games.

Write the statement in quantified form

- A. $\exists x \in X : \sim P(x)$
- B. $\exists x \in X : P(x)$
- C. $\forall x \in X, P(x)$
- D. $\forall x \in X, \sim P(x)$

Negate the quantified statement

- A. $\exists x \in X : \sim P(x)$
- B. $\exists x \in X : P(x)$
- C. $\forall x \in X, P(x)$
- D. $\forall x \in X, \sim P(x)$

2. (6 points) Library/SDSU/Discrete/Predicates/negateB2.pg

Consider the following statement:

Some people are allergic to cats.

For the following questions,

Let $X = \{people\}$

$P(x)$ be the predicate x is allergic to cats.

Write the statement in quantified form

- A. $\forall x \in X, P(x)$
- B. $\forall x \in X, \sim P(x)$
- C. $\exists x \in X : \sim P(x)$
- D. $\exists x \in X : P(x)$

Negate the quantified statement

- A. $\forall x \in X, \sim P(x)$
- B. $\exists x \in X : P(x)$
- C. $\forall x \in X, P(x)$
- D. $\exists x \in X, \sim P(x)$

Translate the negated statement into English

- A. There exists someone that is not allergic to cats
- B. Everyone is allergic to cats
- C. There exists someone that is allergic to cats
- D. Nobody is allergic to cats

3. (4 points) Library/SDSU/Discrete/Predicates/translateB1.pg

Consider the following statement:

Nobody likes the smell of a skunk

For the following questions,

Let $X = \{people\}$

$P(x)$ be the predicate x likes the smell of a skunk.

Write the statement as an existential statement

- A. $\exists x \in X : \sim P(x)$
- B. $\forall x \in X, \sim P(x)$

- C. $\sim \exists x \in X : P(x)$
- D. $\exists x \in X : P(x)$

Write the statement as a universal statement

- A. $\forall x \in X, P(x)$
- B. $\sim \exists x \in X : P(x)$
- C. $\forall x \in X, \sim P(x)$
- D. $\sim \forall x \in X, \sim P(x)$

4. (6 points) Library/SDSU/Discrete/Predicates/translateB2.pg

Consider the following statement:

Not everyone is good at sports.

For the following questions,

Let $X = \{people\}$

$P(x)$ be the predicate x is good at sports.

Write the statement as a universal statement

- A. $\sim (\forall x \in X, P(x))$
- B. $\forall x \in X, \sim P(x)$
- C. $\sim \exists x \in X : \sim P(x)$
- D. $\forall x \in X, \sim P(x)$

Write the statement as an existential statement

- A. $\exists x \in X : P(x)$
- B. $\exists x \in X : \sim P(x)$
- C. $\sim \exists x \in X : P(x)$
- D. $\sim (\exists x \in X : P(x))$

Write the existential statement in English

- A. There exists someone who is not good at sports
- B. There does not exist someone who is not good at sports
- C. There does not exist someone who is good at sports
- D. There exists someone who is good at sports

5. (5 points) Library/ASU-topics/setDiscrete/katie1.4_2.pg

Let $P(x)$ be the statement "x is a duck", let $Q(x)$ be the statement "x is one of my poultry", let $R(x)$ be the statement "x is an officer", and let $S(x)$ be the statement "x is willing to waltz". Express each of the following statements in terms of $P(x)$, $Q(x)$, $R(x)$ and $S(x)$, quantifiers, and logical connectives. Let the universe of discourse consist of all living creatures. Put the appropriate letter next to the corresponding symbolic form.

- ___1. $\forall x(P(x) \rightarrow \neg S(x))$
- ___2. $\forall x(R(x) \rightarrow S(x))$
- ___3. $\forall x(Q(x) \rightarrow \neg R(x))$
- ___4. $\exists x(P(x) \wedge \neg S(x))$
- ___5. $\forall x(Q(x) \rightarrow P(x))$

- a) Some ducks are not willing to waltz.
- b) No ducks are willing to waltz.
- c) No officers ever decline to waltz.

- d) All my poultry are ducks.
e) My poultry are not officers.

6. (5 points) Library/ASU-topics/setDiscrete/katie6.pg

Let $C(x)$ be the statement "x has a cat", let $D(x)$ be the statement "x has a dog" and let $F(x)$ be the statement "x has a ferret". Express each of the following statements in terms of $C(x)$, $D(x)$, and $F(x)$, quantifiers, and logical connectives. Let the universe of discourse consist of all students in your class. Put the appropriate letter next to the corresponding symbolic form.

- ___1. $\forall x(C(x) \vee D(x) \vee F(x))$
___2. $\exists x(C(x)) \wedge (\exists xD(x)) \wedge (\exists xF(x))$
___3. $\exists x(C(x) \wedge D(x) \wedge F(x))$
___4. $\neg \exists x(C(x) \wedge D(x) \wedge F(x))$
___5. $\exists x(C(x) \wedge F(x) \wedge \neg D(x))$

- a) A student in your class has a cat, a dog, and a ferret.
b) All students in your class have a cat, a dog, or a ferret.
c) Some student in your class has a cat and a ferret but not a dog.
d) No student in this class has a cat, a dog, and a ferret.
e) For each of the three animals, cats, dogs, and ferrets, there is a student in your class who has one of these animals.

7. (2 points) Library/SDSU/Discrete/Predicates/predicateB7.pg

Let $D = \{-1, 0, 1, 2, 3\}$ and consider the following statement:

$$\exists d \in D : d^2 - 4d + 4 = 0$$

Is this statement true?

- A. No, no values of d satisfy the statement
- B. Yes, $d = 2$ satisfies the statement
- C. Yes, all values of d satisfy the statement
- D. No, only some values of d satisfy the statement

8. (12 points) Library/Rochester/setDiscrete2Quantifiers/ur_dis_2_2.pg

Determine the truth value of the following statements if the universe of discourse of each variable is the set of real numbers.

- ___1. $\forall x \exists y((x + y = 2) \wedge (2x - y = 1))$
___2. $\forall x \exists y(x^2 = y)$
___3. $\forall x \exists y(x = y^2)$
___4. $\forall x \forall y \exists z(z = \frac{x+y}{2})$
___5. $\exists x \forall y(xy = 0)$
___6. $\exists x \exists y((x + 2y = 2) \wedge (2x + 4y = 5))$
___7. $\exists x \exists y(x + y \neq y + x)$

- ___8. $\exists x \forall y \neq 0(xy = 1)$
___9. $\forall x \neq 0 \exists y(xy = 1)$
___10. $\exists x(x^2 = -1)$
___11. $\forall x \exists y(x + y = 1)$
___12. $\exists x(x^2 = 2)$

9. (6 points) Library/ASU-topics/setDiscrete/katie1.pg

Determine the truth value of the following statements if the universe of discourse is the set of real numbers.

- ___1. $\exists x(x^2 + 2 > 1)$
___2. $\exists x(x^2 > x)$
___3. $\exists x(x^2 = 2)$
___4. $\exists x(x^2 = -1)$
___5. $\exists x \forall y(xy = 0)$
___6. $\forall x(x^2 \neq x)$

10. (5 points) Library/NAU/setFoundations/MAT320_0202.pg

Determine whether the given proposition is true or false, for the universe of all real numbers. Use T for true and F for false.

$$(\forall x)(\exists y)(x^2 + y = 0)$$

Answer: _____

$$(\exists x)(\forall y)(x^2 + y = 0)$$

Answer: _____

$$(\exists x)(\exists y)(x^2 + y = 0)$$

Answer: _____

$$(\forall y)(\exists x)(y = x^2)$$

Answer: _____

$$(\forall y)[y \geq 0 \implies (\exists x)(y = x^2)]$$

Answer: _____