Online HW 5: Transformations

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January 11, 2019

Contents

Set Theory Problems

Short-answer problems about sets.

Problem 1 *Given two sets X and Y, $X \cup Y$ is the set of elements that are*

Multiple Choice:

(a) *in X or in Y (but not in both).*

(b) *in X or in Y (or both, as the "or" is inclusive).*

(c) *in X and in Y.*

(d) *in X but not in Y.*

(e) *in Y but not in X.*

Problem 2 *Given two sets X and Y, $X \cap Y$ is the set of elements that are*

Multiple Choice:

(a) *in X or in Y (but not in both).*

(b) *in X or in Y (or both, as the "or" is inclusive).*

(c) *in X and in Y.*

(d) *in X but not in Y.*

(e) *in Y but not in X.*

Problem 3 *Given two sets X and Y, $X - Y$ is the set of elements that are*

Multiple Choice:

(a) *in X or in Y (but not in both).*

(b) *in X or in Y (or both, as the "or" is inclusive).*

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(c) *in X and in Y.*

(d) *in X but not in Y.*

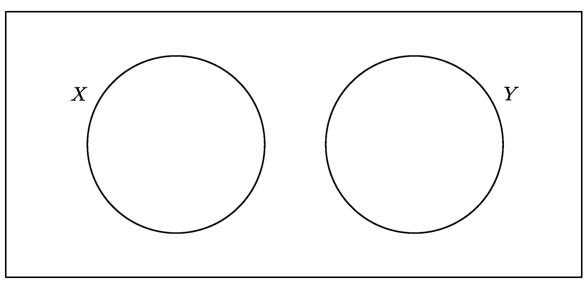
(e) *in Y but not in X.*

Problem 4 *Explain the difference between the symbols $\in$ and $\subset$.*

Problem 5 *How is $\{\emptyset\}$ different from $\emptyset$?*

Problem 6 *Draw a Venn diagram for the set of elements that are in X or Y* but not both. *How does it differ from the Venn diagram for $X \cup Y$?*

Problem 7 *If we let X be the set of "right triangles" and we let Y be the set of "equilateral triangles" does the picture below show the relationship between these two sets?*



Multiple Choice:

(a) *Yes.*

(b) *No.*

(c) *Not enough information.*

Explain your reasoning.

Problem 8 *If $X = \{1, 2, 3, 4, 5\}$ and $Y = \{3, 4, 5, 6\}$ find the following: (List elements in ascending order, separated by commas, with no spaces.)*

(a) $X \cup Y = \{\boxed{?}\}$

(b) $X \cap Y = \{\boxed{?}\}$

(c) $X - Y = \{\boxed{?}\}$

(d) $Y - X = \{\boxed{?}\}$

Problem 9 *Let $n\mathbb{Z}$ represent the integer multiples of n. So for example:*

$$3\mathbb{Z} = \{\dots, -12, -9, -6, -3, 0, 3, 6, 9, 12, \dots\}$$

Compute the following (use capital Z for $\mathbb{Z}$):

(a) $3\mathbb{Z} \cap 4\mathbb{Z} = \boxed{?}$

(b) $2\mathbb{Z} \cap 5\mathbb{Z} = \boxed{?}$

(c) $3\mathbb{Z} \cap 6\mathbb{Z} = \boxed{?}$

(d) $4\mathbb{Z} \cap 6\mathbb{Z} = \boxed{?}$

(e) $4\mathbb{Z} \cap 10\mathbb{Z} = \boxed{?}$

Problem 10 *Make a general rule for intersecting sets of the form $n\mathbb{Z}$ and $m\mathbb{Z}$. Explain why your rule works.*

Problem 11 *If $X \cup Y = X$, what can we say about the relationship between the sets X and Y? Explain your reasoning.*

($X \subset Y$ / $X = Y$ / $Y \subset X$ / $X = \emptyset$) because every element of (X / Y) must be in (X / Y).

Problem 12 *If $X \cap Y = X$, what can we say about the relationship between the sets X and Y? Explain your reasoning.*

($X \subset Y$ / $X = Y$ / $Y \subset X$ / $X = \emptyset$) because every element of (X / Y) must be in (X / Y).

Problem 13 *If $X - Y = \emptyset$, what can we say about the relationship between the sets X and Y? Explain your reasoning.*

($X \subset Y$ / $X = Y$ / $Y \subset X$ / $X = \emptyset$) because every element of (X / Y) must be in (X / Y).

Vocabulary Review

Short-answer, multiple-choice, and select-all questions about key vocabulary.

Question 14 *An* ***equilateral quadrilateral*** *is called a* $\boxed{?}$.

Question 15 *An* ***equiangular quadrilateral*** *is called a* $\boxed{?}$.

Question 16 *An* ***regular quadrilateral*** *is called a* $\boxed{?}$.

Question 17 *A* $\boxed{?}$ *measures* 180°. *(Hint: Answer with two words.)*

Question 18 *Two angles whose measures sum to* 180° *are said to be* $\boxed{?}$.

Question 19 *Two angles whose measures sum to* 90° *are said to be* $\boxed{?}$.

Question 20 *Three (or more) points that lie on the same line are said to be* $\boxed{?}$.

Question 21 *Three (or more) lines that lie on the same point are said to be* $\boxed{?}$.

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