

MAT2362 Minitest #4. Due Oct. 22 before class.

Name:
Student Number:

1. Let $A = \{0, 1, 2, 3\}$. Define the relation $R = \{(0, 0), (0, 1), (1, 2), (1, 3), (2, 3), (3, 3)\}$. Which of the following is true?

- A. $(0, 0) \in R \circ R, (0, 1) \in R \circ R, (0, 2) \in R \circ R$ et $(0, 3) \in R \circ R$
- B. $(0, 0) \in R \circ R, (0, 1) \in R \circ R, (0, 2) \in R \circ R$ et $(0, 3) \notin R \circ R$
- C. $(0, 0) \in R \circ R, (0, 1) \in R \circ R, (0, 2) \notin R \circ R$ et $(0, 3) \notin R \circ R$
- D. $(0, 0) \in R \circ R, (0, 1) \notin R \circ R, (0, 2) \notin R \circ R$ et $(0, 3) \notin R \circ R$
- E. $(0, 0) \notin R \circ R, (0, 1) \in R \circ R, (0, 2) \notin R \circ R$ et $(0, 3) \notin R \circ R$
- F. $(0, 0) \in R \circ R, (0, 1) \notin R \circ R, (0, 2) \in R \circ R$ et $(0, 3) \notin R \circ R$

Answer:

2. True or False? If $R \subseteq A \times B$ is the maximal relation then R° is also maximal.

Answer:

3. Let A be an arbitrary set. Let $R \subseteq A \times A$ be the empty relation, and let $S \subseteq A \times A$ be the maximal relation. Which of the following are true? (Select **all** that apply.)

- A. $R \circ R$ is maximal.
- B. $R \circ S^\circ$ is maximal.
- C. $R \circ S$ is empty.
- D. $(S \circ R)^\circ$ is maximal
- E. $S \circ R = R \circ S$.

Answer(s):

4. True or False? If $R \subseteq A \times A$ is a relation, then $R = R^\circ$ implies that R is the diagonal relation

Δ_A .

Answer:

5. Let $(a, b) = \{a, \{a, b\}\}$ (definition of ordered pair). Calculate (\emptyset, \emptyset) and simplify as much as possible.

Answer:

6. Consider the following relation on the rational numbers \mathbb{Q} : $xRy \Leftrightarrow \exists z \in \mathbb{Q}.xz = y$.

Which of the following is true?

- A. R is empty.
- B. R is maximal.
- C. $R = R^\circ$.
- D. $R \circ R \subseteq R$.
- E. None of the above.

Answer:

7. Consider the strict ordering on the integers \mathbb{Z} :

$$xRy \Leftrightarrow x < y.$$

Which of the following is true?

- A. $R \circ R = R$
- B. $R \circ R \subseteq R$ but not $R \subseteq R \circ R$
- C. $R \subseteq R \circ R$ but not $R \circ R \subseteq R$
- D. Neither $R \subseteq R \circ R$ nor $R \circ R \subseteq R$.

Answer:

8. True or False? For any set A we have $(A+A)+A = A+(A+A)$.

Answer:

9. Find a relation R on the set $A = \{a, b, c\}$ satisfying $R = R \circ R^\circ$.

Answer:

10. Let $A = \{0, 1\}$, $B = \emptyset$, and $C = \{a, b, c\}$. Calculate

(a) The number of relations from A to B .

Answer:

(b) The number of relations from C to A

Answer: