

Correctness Quiz 1

Discrete Structures 1

16 February 2023, 12pm

Name: _____
(please write legibly)

1. If $x < y$, what is the value of $x \bmod y$?
2. What is the maximum possible value of any number $\bmod z$?
3. Let
 - $U = \{x \in \mathbb{Z} : x \in [1, 20)\}$,
 - $A = \{y \in U : (y \bmod 4 = 2) \text{ or } (y \bmod 4 = 0)\}$, and
 - $B = \{z \in U : (z \bmod 6 = 4) \text{ or } (z \bmod 6 = 2) \text{ or } (z \bmod 6 = 0)\}$.
 - (a) What is the value of $|A \cup B|$?
 - (b) What is the value of $|A \cap B|$?
 - (c) What is the set $A - B$?
 - (d) What is the set $B - A$?
 - (e) Is the statement $A \subseteq B$ true? why or why not?
 - (f) Is the statement $A \subset B$ true? why or why not?
 - (g) Can you rewrite B without using any “or” s in the predicate?

4. For the matrices below

$$C = \begin{bmatrix} 5 & -9 \\ \frac{4}{11} & 16 \\ \sqrt{2} & 5 \end{bmatrix} \text{ and } D = \begin{bmatrix} 3 & 7 & \sqrt{2} & 12.5 \\ -3 & 22 & 3 & \frac{3}{2} \end{bmatrix}$$

- (a) Is it valid to compute CD using matrix multiplication? If so, what are the dimensions of the result; if not, why not?
- (b) Is it valid to compute DC using matrix multiplication? If so, what are the dimensions of the result; if not, why not?
- (c) In the matrix (or matrices) that results from parts (a) and (b), how many elements are irrational. If neither is possible put "Neither is Possible".
5. Ceiling ($\lceil \]$) is a function that maps from (a)_____ to (b)_____. (fill in the blank with a symbol)

Where _____ (copy response from a above) is: (explain what the symbol represents)

and _____ (copy response from b above) is: (explain what the symbol represents)