CSPB 2824 - Stade - Discrete Structures

Started on	Tuesday, 19 September 2023, 8:53 PM
State	Finished
Completed on	Tuesday, 19 September 2023, 8:56 PM
Time taken	2 mins 27 secs
Marks	16.00/16.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Let x be an element of nonempty set A, and suppose $x \neq \emptyset$. Select whether each of the following statements are necessarily true or false. A statement that is not necessarily true should be marked as false.

(a) $0 \in \emptyset$ `False`

(b) $\emptyset \subset A$ `True`

(c) $\emptyset \in \{x\}$ `False`

(d) $A - \{x\} \subseteq A$ `True`

> ◻ Correct
>
> Marks for this submission: 1.00/1.00.

Question **2**

Correct

Mark 1.00 out of 1.00

Which of the following sets in **builder** notation is equal to the set S in **roster** notation?

$$S = \{4, 8, 12, 16, 20\}$$

Select one:

○ $\{x \in \mathbb{Z}^+ \mid (\exists y \in \mathbb{Z} \ (x = 4y)) \wedge (x \leq 20)\}$

○ $\{x \in \mathbb{N} \mid (\exists y \in \mathbb{Z} \ (x = 4y)) \wedge (x < 20)\}$

○ $\{x \in \mathbb{N} \mid (\forall y \in \mathbb{Z} \ (x = 4y)) \wedge (x \leq 20)\}$

○ $\{x \in \mathbb{Z} \mid (\exists y \in \mathbb{Z} \ (x = 4y)) \wedge (x \leq 20)\}$

Correct

Marks for this submission: 1.00/1.00.

Question **3**

Correct

Mark 1.00 out of 1.00

Find the sets A and B if the following are true.

$A - B = \{1, 3, 5, 7\}$

$B - A = \{2, 9, 10\}$

$A \cap B = \{4, 6\}$

What is the set A ? [b]

a) $\{1, 3, 5, 7\}$

b) $\{1, 3, 4, 5, 6, 7\}$

c) $\{1, 3, 4, 5, 6, 7, 8\}$

d) $\{1, 2, 3, 4, 5, 6, 7, 9, 10\}$

What is the set B ? [g]

e) $\{1, 2, 3, 4, 5, 6, 7, 9, 10\}$

f) $\{2, 4, 6, 8, 9, 10\}$

g) $\{2, 4, 6, 9, 10\}$

h) $\{1, 5, 6, 8, 10\}$

(Correct)

Marks for this submission: 1.00/1.00.

Question **4**

Correct

Mark 1.00 out of 1.00

Consider the following fact. Suppose A and B are sets, that $S \subseteq A$, $T \subseteq A$, and f is a function mapping $A \to B$. Then $f(S \cap T) \subseteq f(S) \cap f(T)$.

Which of the following sets, subsets and definition for the function f can be used to demonstrate the fact that $f(S \cap T)$ might be a *proper* subset of $f(S) \cap f(T)$?

(Hint: This problem is probably best tackled by actually plugging these sets/subsets into f and seeing which case demonstrates the proper subset case of the above fact, $f(S \cap T) \subset f(S) \cap f(T)$)

Select one:

○ $A = \{-1, 0, 1\}, B = \mathbb{Z}, S = \{-1, 0\}, T = \{0, 1\}, f(x) = x$

○ $A = \{0, 1, 2\}, B = \mathbb{Z}, S = \{0, 1\}, T = \{1, 2\}, f(x) = x^2$

◉ $A = \{-1, 0, 1\}, B = \mathbb{Z}, S = \{-1, 0\}, T = \{0, 1\}, f(x) = x^2$

○ $A = \{-1, 0, 1\}, B = \mathbb{Z}, S = \{-1, 0\}, T = \{0, 1\}, f(x) = x^3$

(Correct)

Marks for this submission: 1.00/1.00.

Question **5**

Correct

Mark 3.00 out of 3.00

Simplify

$\log_{10} (1/10)$	-1
$3^{(2 \log_3 4)}$	16
$\log_{10} 100{,}000$	5
$\log_2 32$	5

Your answer is correct.

(Correct)

Marks for this submission: 3.00/3.00.

Question **6**

Correct

Mark 3.00 out of 3.00

Solve for x

(assume log base 10)

Check your answers by graphing with Desmos.com

* You may discuss the algebra in detail on Piazza. Notice how easy it is to see the solution by graphing.

$\log x = 1 - \log (x - 3)$ `5`

$3^{(4 - x)} = 5$ `4 - (log 5/log 3)`

$\log(x^2) = (\log x)^2$ `100 and 1`

> Your answer is correct.
>
> Correct
>
> Marks for this submission: 3.00/3.00.

Question **7**

Correct

Mark 3.00 out of 3.00

Suppose you divide 1234 by 101.

What is the quotient?

`12`

What is the remainder?

`22`

What is 1234 mod 101?

`22`

> Correct
>
> Marks for this submission: 3.00/3.00.

Question **8**

Correct

Mark 3.00 out of 3.00

Modulo operation on negative numbers can be somewhat confusing. But there is a simple trick:

(-n) mod k equals (k - (n mod k)) mod k.

In other words take, the modulus of the positive number and subtract from the number k, you are taking modulus over.

Eg.,

What is (-50) mod 7?

50 mod 7 = 1

Therefore (-50) mod 7 = 7 - (50 mod 7) = 6.

What is (-100 mod 101)?

| 1 |

What is (-10 mod 3)?

| 2 |

What is (-2824 mod 101)?

| 4 |

Correct

Marks for this submission: 3.00/3.00.