CSPB 2824 - Stade - Discrete Structures

Started on	Monday, 9 October 2023, 12:33 AM
State	Finished
Completed on	Monday, 9 October 2023, 12:37 AM
Time taken	3 mins 53 secs
Marks	16.00/16.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

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 2

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.

Question **3**

Correct

Mark 2.00 out of 2.00

Suppose you have integers a, b and m such that

$a \equiv b \bmod m.$

Further, suppose you know that there exist integers such that

$a = pm + r$ and $b = qm + s$, where $0 \leq r \leq m - 1$ and $0 \leq s \leq m - 1$.

Which one of the following statements is **not** necessarily true?

Select one:

- $s = r$

- ( ) $a \bmod m = b \bmod m$
- ( ) There is some integer k such that $mk = a - b$
- (•) $p = q$

Solution:

From the lecture slides (CK/TW), we know that $a \equiv b \bmod m$ is equivalent to:

1. a and b have the same remainder when divided by m ($r = s$, as well as $a \bmod m = b \bmod m$)

2. $m|(a - b)$ (so $\exists k \in \mathbb{Z}$ such that $mk = a - b$)

This leaves $p = q$ as the remaining, not necessarily true, response.

The correct answer is: $p = q$

Correct

Marks for this submission: 2.00/2.00.

Question **4**

Correct

Mark 2.00 out of 2.00

True or false?

1. Given any positive integer N, you can represent N exactly in the form

$$N = a_k 2^k + a_{k-1} 2^{k-1} + \ldots + a_2 2^2 + a_1 2 + a_0,$$

where the coefficients $a_0, a_1, \ldots, a_k$ are nonnegative integers and $a_k \neq 0$ (for finite k). true

2. Given any positive real number N, you can represent N exactly in the form

$$N = a_k 2^k + a_{k-1} 2^{k-1} + \ldots + a_2 2^2 + a_1 2 + a_0,$$

where the coefficients $a_0, a_1, \ldots, a_k$ are nonnegative integers and $a_k \neq 0$ (for finite k). false

The correct answer is:

True or false?

1. Given any positive integer N, you can represent N exactly in the form

$$N = a_k 2^k + a_{k-1} 2^{k-1} + \ldots + a_2 2^2 + a_1 2 + a_0,$$

where the coefficients $a_0, a_1, \ldots, a_k$ are nonnegative integers and $a_k \neq 0$ (for finite k). [true]

2. Given any positive real number N, you can represent N exactly in the form

$$N = a_k 2^k + a_{k-1} 2^{k-1} + \ldots + a_2 2^2 + a_1 2 + a_0,$$

where the coefficients $a_0, a_1, \ldots, a_k$ are nonnegative integers and $a_k \neq 0$ (for finite k). [false]

Correct

Marks for this submission: 2.00/2.00.

Question **5**

Correct

Mark 2.00 out of 2.00

Suppose you were to use the Euclidean Algorithm in order to find the greatest common divisor of 134 and 41. We would like to examine how many iterations of the algorithm are required in order to calculate this GCD.

For example, in finding gcd(17, 3), there are 3 iterations required:

Iteration 1: $17 = 3 \cdot 5 + 2$

Iteration 2: $3 = 2 \cdot 1 + 1$

Iteration 3: $2 = 1 \cdot 2 + 0$

How many iterations of the Euclidean Algorithm are needed to calculate $\gcd(134, 41)$? 6

Are 41 and 134 relatively prime? Note that two numbers are relatively prime if their GCD is 1. Yes

Solution:

Iteration 1: \(134 = 41\cdot 3 + 11\)

Iteration 2: $41 = 11 \cdot 3 + 8$

Iteration 3: $11 = 8 \cdot 1 + 3$

Iteration 4: $8 = 3 \cdot 2 + 2$

Iteration 5: $3 = 2 \cdot 1 + 1$

Iteration 6: $2 = 1 \cdot 2 + 0$

So 6 iterations are needed.

The last nonzero remainder is the greatest common divisor, so gcd(41, 134) = 1, which means they are relatively prime.

The correct answer is:
Suppose you were to use the Euclidean Algorithm in order to find the greatest common divisor of 134 and 41. We would like to examine how many iterations of the algorithm are required in order to calculate this GCD.

For example, in finding gcd(17, 3), there are 3 iterations required:

Iteration 1: $17 = 3 \cdot 5 + 2$

Iteration 2: $3 = 2 \cdot 1 + 1$

Iteration 3: $2 = 1 \cdot 2 + 0$

How many iterations of the Euclidean Algorithm are needed to calculate $\gcd(134, 41)$? [6]

Are 41 and 134 relatively prime? Note that two numbers are relatively prime if their GCD is 1. [Yes]

Correct

Marks for this submission: 2.00/2.00.

Question **6**

Correct

Mark 2.00 out of 2.00

Suppose you were to use the Euclidean Algorithm in order to find the greatest common divisor of 224 and 47. We would like to examine how many iterations of the algorithm are required in order to calculate this GCD.

For example, in finding gcd(17, 3), there are 3 iterations required:

Iteration 1: $17 = 3 \cdot 5 + 2$

Iteration 2: $3 = 2 \cdot 1 + 1$

Iteration 3: $2 = 1 \cdot 2 + 0$

How many iterations of the Euclidean Algorithm are needed to calculate $\gcd(224, 47)$? 6

Are 47 and 224 relatively prime? Note that two numbers m, n are relatively prime if gcd(m,n) = 1. Yes

Solution:

Iteration 1: \(224 = 47\cdot 4 + 36\)

Iteration 2: $47 = 36 \cdot 1 + 11$

Iteration 3: $36 = 11 \cdot 3 + 3$

Iteration 4: $11 = 3 \cdot 3 + 2$

Iteration 5: $3 = 2 \cdot 1 + 1$

Iteration 6: $2 = 1 \cdot 2 + 0$

So 6 iterations are needed.

The last nonzero remainder is the greatest common divisor, so gcd(47, 224) = 1, which means they are relatively prime.

The correct answer is:

Suppose you were to use the Euclidean Algorithm in order to find the greatest common divisor of 224 and 47. We would like to examine how many iterations of the algorithm are required in order to calculate this GCD.

For example, in finding gcd(17, 3), there are 3 iterations required:

Iteration 1: $17 = 3 \cdot 5 + 2$

Iteration 2: $3 = 2 \cdot 1 + 1$

Iteration 3: $2 = 1 \cdot 2 + 0$

How many iterations of the Euclidean Algorithm are needed to calculate $\gcd(224, 47)$? [6]

Are 47 and 224 relatively prime? Note that two numbers m, n are relatively prime if gcd(m,n) = 1. [Yes]

Correct

Marks for this submission: 2.00/2.00.

Question 7

Correct

Mark 1.00 out of 1.00

I have downloaded the RSA project from the Project Week and have reviewed what I need to do.

Select one:

- (selected) True
- False

The correct answer is 'True'.

Correct

Marks for this submission: 1.00/1.00.

Question **8**

Correct

Mark 1.00 out of 1.00

A good plan for the 3 Week RSA project is:

Select one or more:

- [x] a.
  Review Python as needed.
- [x] b.
  Work on the project as we cover the relevant topics.
- [ ] c.
  Wait until the RSA Week to get started - it'll all work out fine.
- [x] d.
  Schedule some blocks of time each week just for the project.
- [x] e.
  Make sure programming resources are available and working.
- [x] f.
  To read through the project guidelines.

Your answer is correct.

The correct answers are:
To read through the project guidelines.,

Work on the project as we cover the relevant topics.,

Schedule some blocks of time each week just for the project.,

Make sure programming resources are available and working. ,

Review Python as needed.

Correct
Marks for this submission: 1.00/1.00.