Name:____

NetID:____________________ **Lecture:** **A** **B**

Discussion: **Thursday** **Friday** **10** **11** **12** **1** **2** **3** **4** **5** **6**

1. (5 points) Is the following claim true? Informally explain why it is, or give a concrete counter-example showing that it is not.

   For any real numbers x and y, if x or y is irrational, then xy is irrational.

2. (6 points) Use the Euclidean algorithm to compute $\gcd(1012, 299)$. Show your work.

3. (4 points) Check the (single) box that best characterizes each item.

   $7 \mid -7$ true ☐ false ☐

   $k \equiv -k \pmod{k}$ always ☐ sometimes ☐ never ☐

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1. (5 points) Is the following claim true? Informally explain why it is, or give a concrete counter-example showing that it is not.

   Claim: For all positive integers a, b, and c, if $\gcd(a, b) = 1$ and $\gcd(b, c) = 1$, then $\gcd(a, c) = 1$.

2. (6 points) Use the Euclidean algorithm to compute $\gcd(3927, 637)$. Show your work.

3. (4 points) Check the (single) box that best characterizes each item.

$\gcd(k, 0)$ for k non-zero	0 ☐	k ☐	undefined ☐
$7 \equiv 5 \pmod 1$	true ☐	false ☐	

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1. (5 points) Let a and b be integers, $b > 0$. We used two formulas to define the quotient q and the remainder r of a divided by b. One of these is $a = bq + r$. What is the other?

2. (6 points) Use the Euclidean algorithm to compute $\gcd(4263, 667)$. Show your work.

3. (4 points) Check the (single) box that best characterizes each item.

For all prime numbers p, there are exactly two natural numbers q such that $q \mid p$. true ☐ false ☐

Zero is a factor of 7. true ☐ false ☐

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Discussion: **Thursday** **Friday** **10** **11** **12** **1** **2** **3** **4** **5** **6**

1. (5 points) Is the following claim true? Informally explain why it is, or give a concrete counter-example showing that it is not.

   For any positive integers a, b, q and r, if $a = bq + r$, then $\gcd(a, b) = \gcd(a, r)$.

2. (6 points) Use the Euclidean algorithm to compute $\gcd(1568, 546)$. Show your work.

3. (4 points) Check the (single) box that best characterizes each item.

   If a and b are positive and $r = \text{remainder}(a, b)$, then $\gcd(b, r) = \gcd(b, a)$ true ☐   false ☐

   $-7 \equiv 13 \pmod 6$ true ☐   false ☐

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Discussion: **Thursday** **Friday** **10** **11** **12** **1** **2** **3** **4** **5** **6**

1. (5 points) Is the following claim true? Informally explain why it is false, or give a concrete example showing that it is not.

   There is an integer n such that $n \equiv 5 \pmod 6$ and $n \equiv 2 \pmod{10}$?

2. (6 points) Use the Euclidean algorithm to compute $\gcd(7917, 357)$. Show your work.

3. (4 points) Check the (single) box that best characterizes each item.

$\gcd(0, 0)$	0 ☐	k ☐	undefined ☐
$29 \equiv 2 \pmod 9$	true ☐	false ☐	

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Discussion: **Thursday** **Friday** **10** **11** **12** **1** **2** **3** **4** **5** **6**

1. (5 points) Is the following claim true? Informally explain why it is, or give a concrete counter-example showing that it is not.

   For any positive integer k, $(k-1)^2 \equiv 1 \pmod{k}$.

2. (6 points) Use the Euclidean algorithm to compute $\gcd(1183, 351)$. Show your work.

3. (4 points) Check the (single) box that best characterizes each item.

   $k \equiv -k \pmod{7}$ always ☐ sometimes ☐ never ☐

   $-2 \equiv 2 \pmod{4}$ true ☐ false ☐