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Exam II , MTH 213 , Fall 2011

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[YOU HAVE 10 QUESTIONS, EACH = 10 points]

QUESTION 1. a) Solve over Z_{15}, $10x \equiv 5 (mod\ 15)$

b) Solve over Z, $10x \equiv 5 (mod\ 15)$

QUESTION 2. Find all integers where each integer satisfies the following two conditions: I) If each integer is divided by 6, then the remainder is 3, and II) if each integer is divided by 4, then the remainder is 1.

QUESTION 3. Solve over Z, $3x \equiv 1(mod\ 4)$ and $5x \equiv 4(mod\ 7)$ [You need to find all x values that satisfy the two congruent at the same time].

QUESTION 4. Find the $gcd(104, 38)$. Then find two integers K, D such that $gcd(104, 38) = 104K + 38D$.
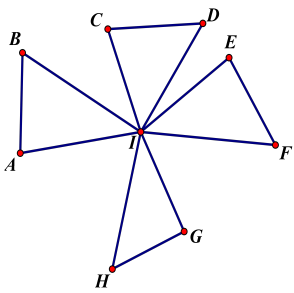
QUESTION 5. a) Find $(101)_7 - (23)_7$

b) Find $(1465)_8 + (2277)_8$

c) Convert $(146)_{10}$ to base 9

d) Convert $(12222)_3$ to base 27.

QUESTION 6. Is the following graph an Euler graph? If yes, then GIVE ME ONE EULER CIRCUIT. If NO, then tell me why?

b) In the graph above find the degree(I).

c)Is the above graph a Hamilton Graph? Explain

d) Find the distance between the two vertices A, G;i.e. Find $d(A, G)$

QUESTION 7. a)Sketch a graph with exactly 4 vertices that is a Hamilton graph but not an Euler graph.

b) Is $K_{3,3}$ a Hamilton graph? If yes, give me a Hamilton cycle. If not, explain

c) Is $K_{3,3}$ an Euler graph? If yes, give me an Euler Circuit. If not, explain.

c) Is it possible to construct a graph $G(V, E)$ such that degree(Each Vertex) = 6 and $|E| = 28$ (note that your graph need not be connected)? Explain

QUESTION 8. Let $m = 11^3 \times 22 \times 44 \times 5^2$, and let $D = \{a \in N \mid 1 < a < m$ and $gcd(a, m) = 220\}$ (note that $220 = 11 \times 4 \times 5$)

a) Find $\phi(m)$

b) Find $\sum_{i \in D} i$

QUESTION 9. Use Math Induction to Prove that $14^n - 1$ is divisible by 13 for each integer $n \geq 1$.

QUESTION 10. Find a mathematical formula for the sequence a_n, where $a_0 = 3$, and $a_1 = 4$, and $a_n = 4a_{n-1} - 4a_{n-2}$ for each $n \geq 2$. Then find the 9th term in the sequence.

Faculty information

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