University Math Challenge

September 9th, 2024 to October 4th, 2024

PROBLEM # 1

(1) Explain why, if I have two distinct positive integers X_1 and X_2, then **either** one of them is divisible by 2, **or** their sum is divisible by 2.

(2) Explain why, if I have three distinct positive integers X_1, X_2 and X_3, then **either** one of them is divisible by 3, **or** some sum formed by adding some combination of them is divisible by 3.

(3) Is it true that if I have four distinct positive integers X_1, X_2, X_3 and X_4, then **either** one of them is divisible by 4, **or** some sum formed by adding some combination of them is divisible by 4? If so, explain why, and if not, give an example for which it is not true.

Direct any questions to
Grant Lakeland (OM 3226)

Rules & Rewards

- Any undergraduate currently enrolled at EIU is eligible to participate.

- Each solution is to be the work of one individual and is to be submitted with the solver's name, year in school, email address, local address, and home address.

- Each solution is to be written or typed and is due in the main Mathematics Department office (OM 3611) by 2:00pm, Friday, October 4th, 2024.

- Entries will be judged on the basis of clarity of exposition and elegance of the solution. That is to say, the *explanation* is more important than the answer.

- An award of $50 will be given for the best solution. In the case of a two-way tie, the award will be evenly split. If there are more than two 'best' solutions, a drawing will be held for the reward. In the case no award is made for this week's challenge, $50 will be added to the next week's award.

- Names of all solvers will be posted on the Challenge of the Month bulletin board and on the Challenge homepage: `http://www.eiu.edu/math/challenge.php`