

University Math Challenge

April 1, 2020 to April 30, 2020

PROBLEM 3

April Fools:

You have seven refrigerator magnets labeled **1, 2, 2, 3, 3**, “+”, and “=”, respectively. You have, additionally, some more magnets that represent unknown non-zero digits **x, y, z, . . .**. The first **seven** magnets are currently arranged on your fridge as **22 + 1 = 33**, which is clearly not a valid equation.

You have two challenges:

(I) Re-arrange **ALL first seven** magnets on the fridge so that a valid equality is shown and ALL the seven magnets are used in that equality;

(II) Arrange **ALL the magnets you have** so that a valid equality is shown and ALL the existing magnets are used in that equality.

Which of the two challenges **always** can be met and which cannot?

If a particular challenge can be met, show how; if it cannot, prove why not. (You should assume there is enough room on the fridge for all the existing magnets.)

*Direct any questions to
Gregory Galperin (ggalperin@eiu.edu)*

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 electronically to Dr. Galperin at ggalperin@eiu.edu by 2:00pm, Friday, April 30, 2020.
- 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>