

Problem of the Week

Proposed by Bernardo Ábrego and Silvia Fernández.

March 7-14

Consider an arbitrary circle of radius 2 in the coordinate plane. What is the largest possible number of *lattice* points inside, but not on, the circle? Justify your answer.

Note: A lattice point is a point whose coordinates are both integer numbers.

Additional Questions.

1. Again consider a circle of radius 2. What is the *smallest* possible number of *lattice* points inside, but not on, the circle?
2. Investigate what happens to these questions if instead of radius 2 we use any other positive number r .
3. Here is a similar flavor but different problem, we change the figure to a square and revert the question: What is the largest area of a square containing exactly three lattice points in its interior. (This question is not open anymore, but a solution could definitely be a nice research project)