Math Problem of the Fortnight

Recruitment

The Orc Warlord Oxhead Spinerend has sent out his best recruiters to the nearby goblin villages to gain an army to attack the elves. He has sent them out for \( n \) days and after the \( n^{th} \) day there will be \( n \) troops arriving to join the army every subsequent day. For example, if he sent them out for 6 days, on the 7th day, 6 goblins would show up to join, on the 8th 6 more would join, ..., on the 10th day there would be a total of 24 troops in the army.

Five days later, the Elven King Aasilliara Whitewood has gotten wind of this and decides to send out his recruiters to the nearby elven settlements to recruit in the same manner. He sends his recruiters out for \( k \) days and after the \( k^{th} \) day, \( k \) troops return every subsequent day.

Whitewood with his elven magic has determined that the first one to amass an army of 100 more troops than the other has will win the war. What can his choices of \( k \) be if he knows Spinerend has sent his recruiters out for 7 days? What about in general, i.e, what relationship do \( n \) and \( k \) have for the elves to win?

The Problem of the Week is open to all undergraduate students, regardless of major. Submit your written solution, along with your name and e-mail address, to the Math Department office (Founders Hall Room 2006) by 2:00 p.m. on Friday November 3, 2017. There is a prize of your choice of a $10 gift certificate to either Komal or Barista’s for the best solution.

http://www.unk.edu/academics/math/problem-of-the-fortnight.php