

1, then there is an integer  $k$  such that  $x + y + 2z = 11k$ .

or simplifying to get  $\frac{1}{v_A} + \frac{1}{v_B} = \frac{1}{4}$ . This expression is symmetric, so if we switch the starting time condition between Anna and Boris, then Anna would cover 2km less and Boris 2km more;  $d = 2$ .

4. Let  $x$  be the four digit number we are trying to find. Then  $x^2 - x = x(x - 1)$  is a number ending in 0000. That is,  $x(x - 1)$  is divisible by  $10\,000 = 2^4 5^4$ . Now  $x$  and  $x - 1$  are coprime, which is to say that they have no prime factors in common. Thus one of  $x - 1$  or  $x$  is divisible by  $2^4$  and the *other* by  $5^4$ . If  $x$  or  $x - 1$  is divisible by  $5^4$ ,

