

# TJVMT POTW

Set #4

11/28/07 - 12/5/07

1S. For some nonnegative integer  $n$ , the leftmost digits of  $2^n$  and  $5^n$  are both  $x$ . Find all possible values of  $x$ .

2P. A plane is colored with two different colors. Prove that there exists a rectangle whose vertices have the same color.

3S. Let  $f(a) = \frac{1}{1+a}$ . Given that  $x$  is a real number such that  $\tan x$  and  $\cot x$  are positive, find the number of different values  $f(\tan x) + f(\cot x)$  can take on.