



(b) If  $D$  lies on  $BC$  produced so that  $DEF$  is a straight line, prove that  $P$  also lies on the circumcircle of the triangle  $ABC$ .

6. A  $n$  digit number is narcissistic if the sum of its digits each raised to the power of  $n$  equals the number. Show that there are no 2-digit narcissistic numbers.

#### Senior Questions

1. Show that the function  $f(x) = (x-1)\ln 10 - x\ln 9 - \ln x$  is positive for all  $x \in \mathbb{N}$  for some  $N$ .

2.