Homework problems

1. Show that the probability that a number starts with either 10, 11, 12, 13, or 14 is *the same* as the probability that it starts with a 2.

2. (a) Draw the interval $[0, 3]$ and mark the points $\log_{10}(2^k)$ for $1 \leq k \leq 9$.
(b) If x is a real number, let $\lfloor x \rfloor$ denote the result of rounding x down to a whole number. For example, $\lfloor \pi \rfloor = 3$, and $\lfloor 0.99999 \rfloor = 0$. Show that if n is any integer, there are exactly

$$\lfloor n \log_{10}(2) \rfloor$$

values of k, $1 \leq k \leq n$, so that 2^k begins with a 1.