

(b) Prove that $2^{567} > (30)^{100}$

$$2^{567}$$

$$30^{100}$$

$$2^5 > 30$$

$$(2^5)^{100} > (30)^{100}$$

$$\underbrace{2^5 \times 2^5 \times 2^5 \times 2^5 \times \dots \times 2^5}_{100} = 2^{500}$$

$$2^{500} > (30)^{100}$$

$$2^{567} > 2^{500}$$

$$2^{567} > (30)^{100}$$

HW

(a) Find quotient and remainder when the number consisting of 1001 sevens is divided by the number 1001.

Hint

$$\underbrace{777 \dots 7}_{1001}$$

→

$$\begin{array}{r}
 77700077 \\
 1001 \overline{) 77777777} \\
 \underline{- 7007} \\
 7707 \\
 \underline{- 7007} \\
 7007 \\
 \underline{- 7007} \\
 0
 \end{array}$$

$$\frac{77777}{1001} = 77 + \text{⓪}$$

Q. 8 taps are fitted to a water tank. Some of them are water taps to fill the tank and the remaining are outlet taps used to empty the tank. Each water tap can fill the tank in 12 hours and each outlet tap can empty it in 36 hours. On opening all the taps, if the tank is filled in 3 hours find the number of water taps.

Let the total number of water taps be x .

Let the number of outlet taps be $8 - x$.

Since, 1 water tap fills up the tank in 12 hrs.

In 1 hr, 1 water tap fills up $\frac{1}{12}$ tank

Since, 1 outlet tap removes all water in 36 hrs

In 1 hr, 1 outlet tap empties $\frac{1}{36}$ of tank

$$\text{So A/Q, in 3 hrs, } \frac{x}{12} \times 3 - \frac{8-x}{36} \times 3 = 1$$

$$\Rightarrow 3x - 8 + x = 12$$

$$\Rightarrow x = 5$$