Q1- A step-up transformer has a primary coil with 100 loops and a secondary coil with 1,500 loops. If the primary coil is supplied with a household current of 120 V and 15 A,
(a) what voltage is produced in the secondary circuit?
(b) What current flows in the secondary circuit?

(a) The ratio of the voltage induced in to the secondary and voltage input in primary is same as the ratio of number of turns in the two coils. Thu the voltage produced in the secondary coil is give by the ratio

$$\frac{Vs}{Vp} = \frac{Ns}{Np}$$

Or $$Vs = Vp * \frac{Ns}{Np}$$

Or $$Vs = 120 * \frac{1500}{100} = 1800 \text{ V}$$

(b) If the transformer is ideal, there will be no loss of energy and hence the
Output power = Input power

Or $$Vs * Is = Vp * Ip$$

Or $$Is = \frac{Vp * Ip}{Vs} = \frac{120 * 15}{1800} = 1 \text{A}$$

Q2- The step-down transformer in a local neighborhood reduces the voltage from a 7,200 V line to 120 V.
(a) If there are 125 loops on the secondary, how many are on the primary coil?
(b) What current does the transformer draw from the line if the current in the secondary is 36 A?
(c) What are the power input and output?

(a) Using the same relation

$$\frac{Vs}{Vp} = \frac{Ns}{Np}$$

Or $$Np = \frac{Ns * Vp}{Vs} = \frac{125 * 7200}{120} = 7500$$

(b) The current in primary is given by
Output power = Input power

Or $$Vs * Is = Vp * Ip$$

Or $$Ip = \frac{Vs * Is}{Vp} = \frac{120 * 36}{7200} = 0.6 \text{ A}$$

(c) Input and out powers are the same and equal to

$$Pin = Vp * Ip = 7200 * 0.6 = 4320 \text{W}$$

$$Pout = Vs * Is = 120 * 36 = 4320 \text{W}.$$