MA 341

Exercises on finding e-th roots

1) Solve the following congruences:

$$a) \quad x^{329} \equiv 452 \ (mod\ 1147)$$

$$b) \quad x^{113} \equiv 345 \ (mod\ 463)$$

$$c) \quad x^{275} \equiv 139 \ (mod\ 588)$$

2) What goes wrong if we try to use our method of finding e-th roots to try to solve the congruence

$$x^2 \equiv 23 \ (mod\ 263) \ ?$$

Some Additional Exercises on Values of $\phi(n)$

1) Find all the positive integers n satisfying:

a) $\phi(n) = 12$

b) $\phi(n) = 14$

c) $\phi(n) = 24$