Homework 15, due October 11

(1) Prove or provide a counterexample for each.
   (a) $\gcd(n, \varphi(n)) > 1$.
   (b) If $d|m$, then $\varphi(d)|\varphi(m)$.
   (c) If the same primes divide m and n, then $n\varphi(m) = m\varphi(n)$.

(2) Your public key is $e = 17$. You know that the factors of n are

$$780320622220857229741217686043056139217372827729$$

and

$$9531007548716379717949045703916959416008554377234 3.$$

You receive the following message:

```
702155576874903591303379076630402140750094493371947 1939\
8237954006957457425093255084977458336404619 43
```

Decrypt.

(3) You know

```
n = 702481473104072639315637464320489479946650918 71605\
693055351126905140828095606811610144200192558012 41
```

and

```
phi(n) = 702481473104072639315637464320489479946650918\
716023278558997871329327245348566589796364589613226730 0
```

Find the prime factors of n.