N19

if n is not prime $\rightarrow n = ab$ where a and $b > 1$

$2^n - 1 = a^{ab} - 1$ is not prime

N25

a) $\gcd(3^5 \cdot 5^3)$

b) $\gcd(1)$

c) $\gcd(23^{17})$

d) $\gcd(41 \cdot 43 \cdot 53)$

e) $\gcd(1)$

f) $\gcd(1111)$

N37

$\gcd(2^a - 1, 2^b - 1)$, if $b = 1 \rightarrow 1 = 2^{\gcd(a,b)} - 1$

$\gcd(2^b - 1, (2^a - 1) \bmod (2^b - 1))$.

$\gcd(2^b - 1,$

$2^{a \bmod b} - 1 \rightarrow b$ and $a \bmod b \rightarrow 2^{\gcd(a,b)} - 1$

HomeWork N 18

N5

$10! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10$

1 - ~~prime~~

2 - prime

3 - prime

$$\begin{array}{r|l} 4 & 2 \\ 2 & 2 \end{array}$$

5 - prime

$$\begin{array}{r|l} 6 & 3 \\ 2 & 2 \end{array}$$

7 - prime

$$\begin{array}{r|l} 8 & 2 \\ 4 & 2 \\ 2 & 2 \end{array}$$

$$\begin{array}{r|l} 9 & 3 \\ 3 & 3 \end{array}$$

$$\begin{array}{r|l} 10 & 2 \\ 5 & 5 \end{array}$$

$10!$ factorization $\rightarrow 2^8 \cdot 3^4 \cdot 5^2 \cdot 7^1$

N11

$\log_2 3 = \frac{p}{q}$

$\log_b a \Leftrightarrow b^c = a$

$2^{\frac{p}{q}} = 3 \rightarrow 2^p \neq 3^q$

$\log_2 3$ is irrational