Exercises:

1) Calculate $d(2\cdot 6^n)$, $\sigma(2\cdot 6^n)$

2) Prove $d(p^2-p)$ - even for any p prime ≥ 3

3) Prove $(p+1) \mid \sigma(p^2+p)$, p - prime

4) Prove $\mu(p^2-p) = -\mu(p-1)$, p - prime

5) Prove
$$\sigma(p^3+p^2) = (p^2+p+1)\sigma(p+1)$$
p - prime

6) Prove $\varphi(p^2-p) = (p-1)\varphi(p)$
p - prime

7) Prove $d(2^{n+2}-2^n) = 2(n+1)$

8) Prove $2^{n-1} \mid \varphi(4^n+2^n)$

9) Calculate $\sigma(3^n-3^{n-1})$

10) $\varphi(p^{n+1} - p^n) = (p^n - p^{n-1})\varphi(p-1)$

11) $d(p^{n+1} + p^n) = (n+1)\, d(p+1)$

12) $\sigma(p^{n+1} + p^n) = \frac{p^{n+1}-1}{p-1}\, \sigma(p+1)$