

$$23911 \equiv 5 \pmod{11}$$

$$915 \equiv 2 \pmod{11}$$

$$5x \equiv 2 \pmod{11} \Rightarrow x \equiv -4 \pmod{11}$$

$$x \equiv 3 \pmod{4}$$

$$x = 4t + 3 = 4(81s + 39) + 3$$

$$x \equiv -3 \pmod{81}$$

$$= 324s + 159$$

$$= 324(11r + 7) + 159$$

$$4t + 3 \equiv -3 \pmod{81}$$

$$= 3564r + 2427$$

$$81t \equiv 0$$

$$4t \equiv -6 \pmod{81}$$

$$t \equiv 120 \equiv 39 \pmod{81}$$

$$t = 81s + 39$$

$$x \equiv -4 \pmod{11}$$

$$324s + 159 \equiv -4 \pmod{11}$$

$$11s \equiv 0 \pmod{11}$$

$$5s \equiv 2 \pmod{11}$$

$$s \equiv 7 \pmod{11}$$

$$a = p_1^{n_1} \cdots p_k^{n_k}$$

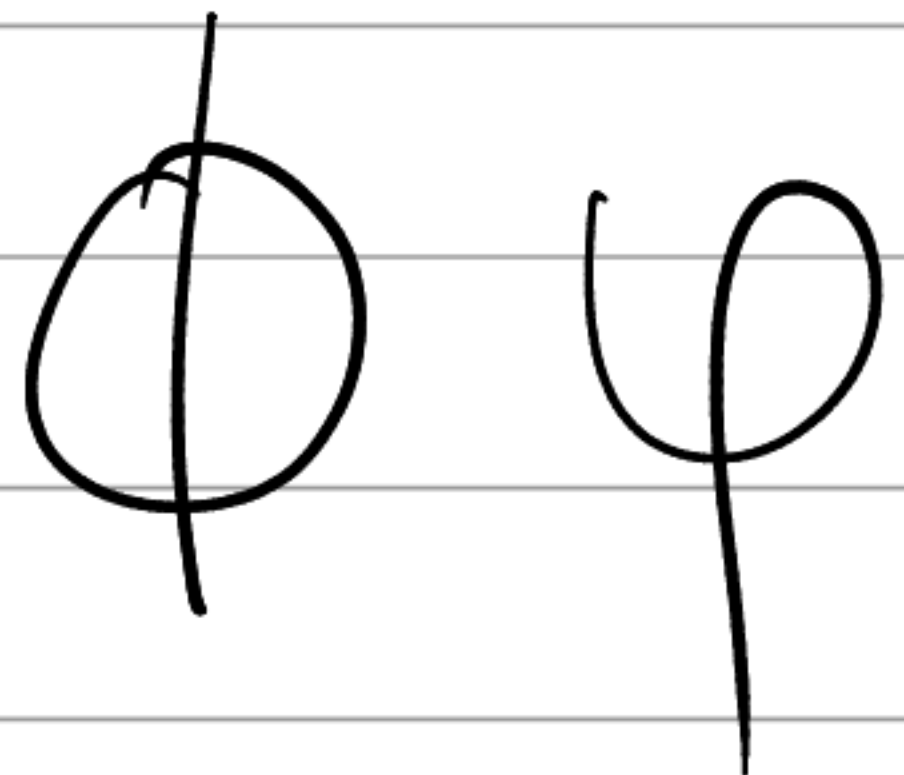
$$k=1: a = p^n$$

$$\sigma(a) = 1 + p + p^2 + \cdots + p^n$$

$$= \frac{p^{n+1} - 1}{p - 1}$$

$$p \equiv a \pmod{m}$$

$$p \equiv 9 \pmod{12}$$



$$f(a) = f(p_1^{\alpha_1} \cdots p_k^{\alpha_k})$$

$$= f(p_1^{\alpha_1}) \cdot f(p_2^{\alpha_2} \cdots p_k^{\alpha_k})$$

\vdots

$$= f(p_1^{\alpha_1}) \cdot f(p_2^{\alpha_2}) \cdots f(p_k^{\alpha_k})$$

$\varphi(6)$

$$(a, n) = (a+n, n)$$

1	7
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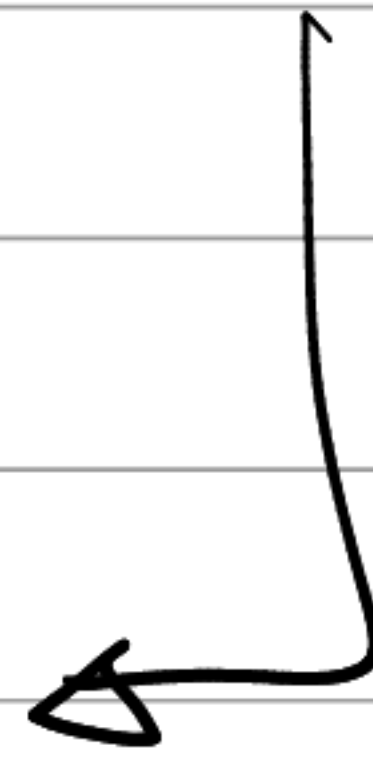
2	8
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3	9
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4	10
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5	11
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6	12
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$$\varphi(p_1^{\alpha_1} \cdots p_k^{\alpha_k}) = (p_1^{\alpha_1} - p_1^{\alpha_1 - 1}) \cdots (p_k^{\alpha_k} - p_k^{\alpha_k - 1})$$

$$\begin{aligned} \varphi(72) &= \varphi(2^3 \cdot 3^2) = (2^3 - 2^2)(3^2 - 3^1) \\ &= 4 \cdot 6 = 24 \end{aligned}$$

~~0~~

$$1 \mapsto 3 \cdot 1 \equiv 3$$

$$2 \mapsto 3 \cdot 2 \equiv 1$$

$$3 \mapsto 3 \cdot 3 \equiv 4$$

$$4 \mapsto 3 \cdot 4 \equiv 2$$

$$a \equiv 3 \pmod{5}$$

n	0	1	2	3	4	5	6
$2^n \pmod{9}$	1	2	4	-1	-2	-4	1

$$a^0 \equiv a^{\varphi(m)} \pmod{m} \Rightarrow 0 \equiv \varphi(m) \pmod{r}$$

E.v. $\Leftrightarrow r \mid \varphi(m)$

$$a^t \equiv a^s \pmod{m} \Leftrightarrow t \equiv s \pmod{\varphi(m)}$$

$(a, m) = 1$