2 - 2, 4, 6, 8, 0

3 - 3, 9, 7, 1,

4 - 4, 6, 4, 6

5 - 5

6 - 6

7 - 7, 9, 3, 1

8 - 4, 2, 6.

9 - 1, 9, 1

10 - 0

11 - 1, 1

13 - 3, 9, 7, 1

① $a = 7^{15}$, $b = 5$

Power ending numbers & repeat for 7 - 7, 9, 3, 1

So, 7^{15} ending will 3

Remainder - 3

② $a = 11^{21}$; $b = 7$

Power ending numbers for 11 will be always 1,

Since the power is also ending with 1

Last two numbers will be 11, Last three will be 211

Remainder - 1

③ $a = 2^{22}$; $b = 13$

Last numbers of 2 pow will always be, 2, 4, 6, 8, 0

13 is odd So the num will not satisfy.

Last digit is 4, then Last 3 is 304

Remainder - 10

④ $a = 13^{30}$ $b = 11$

Last digit will be 9,

$$\frac{13^{30}}{11} = \frac{(13^{15})^2}{11} = \frac{13^{10} \times 13^{10} \times 13^{10}}{11}$$

$\frac{13^{10}}{11}$ = remainder will be 1

So this applies to all

Remainder - 1

⑤ $a = 3^{31}$; $b = 17$

Last digit will be 7.

$$\frac{3^{31}}{17} = \frac{(3^{15})^2 \times 3^{16}}{17} \Rightarrow \frac{3^{15}}{17} \quad \frac{3^4}{17}$$

$\downarrow$ $\downarrow$

2 4

Remainder - 6

① $n = 10$ $\frac{10}{3} = 1$ (remainder)

$n^3 = 1000$ $\frac{1000}{9} = 1$ (remainder)

② $n = 11$ $\frac{11}{7} = 4$ (remainder)

$3n^2 =$ $\frac{363}{21} = 6$ (remainder)

③ $n = 14 =$ $\frac{14}{5} = 4$ (remainder)

$2n^2 + 4n + 3$ $\frac{451}{10} = 1$ (remainder)

④ $93441x + 2844y = 12345$

$93441x + 2844y - 12345 = 0$

$3(31147x + 948y - 4115)$

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④ $93441x + 2844y = 12345$

$93441x + 2844y - 12345 = 0$

$3(31147x + 948y - 4115)$

$y = mx + b$

$y = \frac{4115}{948} = 4.34072$

$x = \frac{415}{31147} = 0.13212$