

Find the Remainder

by Gonit Sora - Monday, January 28, 2013

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1) The remainder when 3^{31} is divided by 5 is

A) 2 B) 3 C) 4 D) 1

(Hint: - $\gcd(3,5)=1$ and $\phi(5)=4$, thus $3^4 \equiv 1 \pmod{5}$.)

2) The remainder when 5^{99} is divided by 13 is

A) 0 B) 8 C) 1 D) 4

3) The remainder when 7^{2010} is divided by 25 is

A) 9 B) 18 C) 3 D) 24

4) The remainder when 7^{51} is divided by 144 is

A) 49 B) 55 C) 21 D) 143

(Hint: $\gcd(7,144)=1$. $\phi(144)=48$.)

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5) What is the value of $123^{241} \pmod{35}$?

A) 18 B) 24 C) 32 D) 16

(Hint: $123 \equiv 18 \pmod{35}$.)

6) A number when divided by 765 leaves a remainder 42. What will be the remainder if the number is

Find the Remainder - 01-28-2013

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divided by 17? [Asked in "MAT"]

A) 8 B) 7 C) 6 D) 5

7) The remainder, when $15^{23} + 23^{23}$ is divided by 19 is [Asked in "CAT"]

A) 4 B) 15 C) 0 D) 18

8) The rightmost non zero digit of the number 30^{2720} is [Asked in "CAT"]

A) 1 B) 3 C) 7 D) 9

9) If $P = 16^3 + 17^3 + 18^3 + 19^3$ then P divided by 70 leaves a remainder of [Asked in CAT]

A) 0 B) 1 C) 69 D) 35

[Hint:- $P = 35 \times$ (an even number)]

10) What are the last two digits of 7^{2008} ? [CAT]

A) 21 B) 61 C) 01 D) 41 E) 81

(Hint:- 7 belongs to $U(100)$ and $U(100)$ is isomorphic to $Z_2 + Z_{20}$, thus $7^{20} = 1$ in $U(100)$.)

11) What are the last three digits of 17^{102} ?

A) 001 B) 017 C) 289 D) 513

(Hint:- 17 belongs to $U(1000)$ and $U(1000)$ is isomorphic to $Z_2 + Z_2 + Z_{100}$, thus $17^{100} = 1$ in $U(1000)$.)

12) Let $p = 1! + (2 \cdot 2!) + (3 \cdot 3!) + \dots + (10 \cdot 10!)$, then $p+2$ when divided by $11!$ leaves a remainder of

A) 10 B) 0 C) 7 D) 1

(Hint:- $1! + (2 \cdot 2!) = (2-1) \cdot 1! + (3-1) \cdot 2! = (2! - 1!) + (3! - 2!) = 3! - 1$.)

13) The remainder, when $1! + 2! + 3! + \dots + 99! + 100!$ is divided by 12 is

A) 11 B) 9 C) 3 D) 1

14) The remainder, when $1^5+2^5+3^5+\dots+99^5+100^5$ is divided by 4 is

A) 2 B) 0 C) 1 D) 3

(Hint:- $(2n)^5 \equiv 0 \pmod{4}$, $1^5 \equiv 1 \pmod{4}$ and $3^5 \equiv -1 \pmod{4}$.)

15) The remainder, when $1^4+2^4+3^4+\dots+99^4+100^4$ is divided by 4 is

A) 2 B) 0 C) 1 D) 3

Answers:

1) A 2) B 3) D 4) B 5) A 6) A 7) C 8) D 9) A 10) C 11) C 12) D 13) B 14) B 15) A

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