MATHS

BOOKS - MTG WBJEE MATHS (HINGLISH)

PRINCIPLE OF MATHEMATICAL INDUCTION

Wb Jee Workout

1. The statement P(n): $''1 \times 1! + 2 \times 2! + 3 \times 3! + ... + n \times Xn! = (n+1)! - 1''$ is

A. true for all $n > 1$

B. not true for any n

C. true for all n $\in$ N

D. None of these

Answer: C

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2. Let $P(n): n^2 + n$ is an odd integer and $P(K) \Rightarrow P(k+1)$ is true, then P(n) is true for all

A. $n > 2$

B. $n > 1$

C. n

D. None of these

Answer: D

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3. The greatest positive integer which divides $n(+1)(n+2)...(n+1-)[n \in N]$is

A. $r!$

B. $(r+1)!$

C. $n+r$

D. $n-r+1$

Answer: A

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4. Let P(n) be a statement such that truth of$P(n) \Rightarrow$ the truth of P(n + 1)[n $\in$ N, then P(n) is true

A. $\forall n > 1$

B. $\forall n$

C. Nothing can be said

D. $\forall n > k$ (k is some fixed positive integer)

Answer: C

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5. $Let P(n) = n(n+1)$ is an even number , then which of the following is true ?

A. $p(3)$

B. $p(100)$

C. $p(50)$

D. All of these

Answer: D

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6. Let P(n) be the statement $n^3 + n$is 3m such that m is a positive integer, then which of the following is true?

A. $P(1)$

B. $p(2)$

C. $P(3)$

D. $P(4)$

Answer: C

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7. Let the statement $r^2 > 100,$ the statement P(k+1) will he true if

A. $P(1)$ is true

B. P(2) is true

C. P(K) is true

D. None of these

Answer: C

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8. If P (n) be the statement $n(n+1)+1$ is odd , then which of the following is even ?

A. $P(2)$

B. $P(3)$

C. $P(4)$

D. None of these

Answer: D

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9. The statement $P(n) = 9^{th} - 8^n$, when divided by 8, always leaves the remainder

A. 1

B. 3

C. 1

D. 7

Answer: C

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10. Let P(k): 2 + 4 + 6 + ... + 2k = kk + 1) + 2, then the statement P(m + 1) will be true if

A. P(1) is true

B. P(2) is true

C. P(m) is true

D. None of these

Answer: C

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11. Let $P(n) = 2^{3n} - 7n - 1$ then $P(n)$ is divisible by

A. 63

B. 36

C. 49

D. 25

Answer: C

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12. If $n \in N,$ then $11^{n+2} + 12^{2n+1}$ is divisible by

A. 113

B. 123

C. 133

D. None of these

Answer: C

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13. Let P (n) $= 5^n - 2^n$, $P(n)$ is divisible by 3λ where λ and n both are odd positive integers then the least value of n and λ will be

A. 13

B. 11

C. 1

D. 5

Answer: C

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14. Let $P(n): a^n + b^n$ such that a, b are even , then P(n) will be divisible by $a + b$ if

A. $n > 1$

B. n is odd

C. n is even

D. None of these

Answer: B

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15. If a,b are any two odd positive integers such that $a > b$. Then the largest positive integer which divides all the numbers of the numbers of the form $a^1 - b^2$ Is

A. 6

B. 5

C. 8

D. 9

Answer: C

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16. For all positive integers $n > 1$, $\{x(x^{n-1} - na^{n-1}) + a^n(n-1)\}$ is divisible by

A. (x-a)

B. x-a

C. 2(x-a)

D. x+a

Answer: B

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17. For each $n \in N$, $2^{3n} - 1$ is divisible by

A. 7

B. 8

C. 6

D. 16

Answer: A

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18. Let $P(n): 2^n < (1 \times 2 \times 3 \times \ldots. \times n)$. Then the smallest positive integers for which P(n) is true , is

A. 1

B. 2

C. 3

D. 4

Answer: D

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19. If $P(n)$ is the statement ,

$$,, \frac{1}{1\times 2}+\frac{1}{2\times 3}+\frac{1}{2\times 3}+\frac{1}{3\times 4}+\ldots..+\frac{1}{n(n+1)}=\frac{n}{n+1}$$

' then P(n) is true for

A. $n>2$

B. $n\in Z$

C. $n\in N$

D. No value of n

Answer: C

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20. For each natural number the statement $P(n)=n(n+1)(2n+1)$ is divisible by

A. 6

B. 8

C. 10

D. 4

Answer: A

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21. Let P(n) be the statement $n^2 - n - 41$ is prime , then which of the following is not true ?

A. $P(2)$

B. $P(3)$

C. $P(41)$

D. None of these

Answer: C

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22. Let $P(n): 2^{n+2} < 3^n$, is true for

A. $n \in N$

B. $n > n,\ \forall n \in N$

C. $n > 2,\ \forall n \in N$

D. None of these

Answer: B

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23. Let $P(n): 1 + \frac{1}{4} + \frac{1}{9} + \ldots. + \frac{1}{n^2} < 2 - \frac{1}{n}$, is true

A. $\forall n$

B. for n=1

C. For $n > I$, $\forall n \in N$

D. None of these

Answer: C

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24. Let $P(n) : s^n > n \forall n \in N$ and $2^k > k$, $\forall n = K$ then which of the following is true $\forall k \geq 2$?

A. $2^k > 5K > 1$

B. $2^{k+1} > 2k > k + 1$

C. $2^k > 2(k + 1) > k$

D. None of these

Answer: B

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25. If n is a positive integer , then $5^{2n+2} - 24n - 25$ is divisible by

A. 574

B. 575

C. 674

D. 576

Answer: D

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26. Let P(n) be the statement represent the sum of three successive natural numbers $\forall n \in N,$ then the smallest value of n

for which $P(n)$ is divisible by 9 , is

A. 1

B. 3!

C. 3

D. 9!

Answer: A

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27. The inequality $n! > 2^n$ is true for

A. $n \geq 4$

B. $n > 1$

C. $n > 2$

D. $\forall n, n \in N$

Answer: A

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28. The sum $S_n = n^3 + 3n^2 + 5n + 3$ is divisible by

A. $3 \forall n \in N$

B. $4 \forall n \in N$

C. $5 \forall n \in N$

D. can't be determined

Answer: A

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29. IF a and b are natural numbers such that $a^2 - b^2$ is prime number then $a^2 - b^2$ equals

A. $a+b$

B. $a-b$

C. ab

D. 1

Answer: A

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30. Let $P(n)=\frac{n^5}{5}+\frac{n^3}{3}+\frac{7n}{15}$ is natural number , is true statement

A. Only for $n>1$

B. only for n is an odd positive integer

C. Only for n is an even positive integer

D. $\forall n \in N$

Answer: D

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Wb Jee Previous Years Questions

1. The remainder obtained when $1! + 2! + 3! + \ldots\ldots + 11!$ is divided by 12 is

A. 9

B. 8

C. 7

D. 6

Answer: A

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2. Let a, b, c, d be any four real numbers , then $a^n + b^n = c^n + d^n$ holds for any natural number n, if

A. $a + b = c + d$

B. $a - b = c - d$

C. $a + b = C + d, a^2 + b^2 = c^2 + d^2$

D. $a - b - c - d, a^2 - b^2 = c^2 - d^2$

Answer: D

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3. For +ve integer n, $n^3 + 2n$ is always divisible by

A. 3

B. 7

C. 5

D. 6

Answer: A

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4. $7^{2n} + 16 - 1(n \in N)$ is divisible by

A. 65

B. 63

C. 61

D. 64

Answer: D

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