



MATHS

BOOKS - CENGAGE

PRINCIPLE OF MATHEMATICAL INDUCTION



1. Find the derivative of $y = 3 \sin 4x + 5 \cos 2x^3$.

Watch Video Solution

2.
$$1 + \frac{1}{(1+2)} + \frac{1}{(1+2+3)} + \dots + \frac{1}{(1+2+3+\dots n)} = \frac{2n}{(n+1)}$$

3. Prove that by using the principle of mathematical induction for all $n \in N$:

$$1.3 + 2.3^2 + 3.3.^3 + + n.3^n = rac{(2n-1)3^{n+1} + 3}{4}$$

Watch Video Solution

4. Prove that by using the principle of mathematical induction for all

 $n\in N$:

n(n+1)(n+5) is a multiple of 3

Watch Video Solution

5. Prove that by using the principle of mathematical induction for all

 $n\in N$:

 $3^{2n+2}-8n-9$ is divisible by 8

6. Prove that by using the principle of mathematical induction for all

 $n\in N$:

 $41^n - 14^n$ is multiple of 27

7. Prove that by using the principle of mathematical induction for all

 $n\in N$:

$$\left(2n+7\right) < \left(n+3\right)^2$$

Watch Video Solution

8. Evaluate
$$\int rac{2x^3-1}{x^4+x} dx$$

9. A sequence a_1, a_2, a_3, \ldots is defined by letting $a_1 = 3$ and $a_k = 7a_{k-1}$, for all natural numbers $k \le 2$. Show that $a_n = 3 \cdot 7^{n-1}$ for natural numbers.

Watch Video Solution

10. Find the L.C.M. of the given expressions $2p^2 - 3p - 2, \, p^2 - 9.$

Watch Video Solution

11. Evaluate
$$\int\!\!\frac{2x-3}{x^2-3x+5}dx$$

Watch Video Solution

12. If p is a fixed positive integer, prove by induction that $p^{n+1}+(p+1)^{2n-1}$ is divisible by P^2+p+1 for all $n\in N.$

13. Evaluate
$$\int \frac{x-1}{x^2-2x-35} dx$$

Watch Video Solution

Exercise

1. Prove that by using the principle of mathematical induction for all $n\in N$: $1.3+3.5+5.7+\ldots+(2n-1)(2n+1)=rac{nig(4n^2+6n-1ig)}{3}$

Watch Video Solution

2. Using the mathematical induction, show that for any natural number

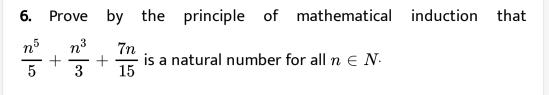
n,
$$\frac{1}{1.2.3} + \frac{1}{2.3.4} + \frac{1}{3.4.5} + \ldots + \frac{1}{n.(n+1).(n+2)} = \frac{n(n+3)}{4(n+1)(n+2)}$$

3. By mathematical induction prove that 2^{3n} -1 is divisible by 7.

Watch Video Solution
4. Evaluate
$$\int \frac{2x-5}{x^2-5x+6} dx$$

Watch Video Solution

5. Using principle of mathematical induction prove that $\sqrt{n} < \frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \dots + \frac{1}{\sqrt{n}}$ for all natural numbers $n \ge 2$



Watch Video Solution

7. Using principle of mathematical induction, prove that $7^{4^n} - 1$ is divisible by 2^{2n+3} for any natural number n.

Watch Video Solution

8. Prove by mathematical induction that n^5 and n have the same unit digit for any natural number n.



9. A sequence b_0, b_1, b_2, \ldots is defined by letting $b_0 = 5$ and $b_k = 4 + b_{k-1}$, for all natural number k. Show that $b_n = 5 + 4n$, for all

natural number n using mathematical induction.

