

MATH 6101 090

Solutions

Assignment 3

1. Find the first five terms of the expansion for $(1+x^2)^{1/3}$

$$(1+x^2)^{1/3} = 1 + \frac{1}{3}x^2 - \frac{1}{9}x^4 + \frac{5}{81}x^6 - \frac{10}{243}x^8 + \frac{22}{729}x^{10} + \dots$$

2. Find the first five terms of the expansion for $(1-2x^3)^{1/3}$

$$(1-2x^3)^{1/3} = 1 - \frac{2}{3}x^3 - \frac{4}{9}x^6 - \frac{40}{81}x^9 - \frac{160}{243}x^{12} + \frac{704}{729}x^{15} + \dots$$

3. Find the first five terms of the expansion for $(1-x)^{5/3}$

$$(1-x)^{5/3} = 1 - \frac{5}{3}x + \frac{5}{9}x^2 + \frac{5}{81}x^3 + \frac{5}{243}x^4 + \frac{7}{729}x^5 + \dots$$

4. Find the first five terms of the expansion for $(1+x^2)^{5/3}$

$$(1+x^2)^{5/3} = 1 + \frac{5}{3}x^2 + \frac{5}{9}x^4 - \frac{5}{81}x^6 + \frac{5}{243}x^8 - \frac{7}{729}x^{10} + \dots$$

5. Find the first five terms of the expansion for $(1-x)^{-2}$

$$(1-x)^{-2} = 1 + 2x + 3x^2 + 4x^3 + 5x^4 + 6x^5 + \dots$$

6. Find the first five terms of the expansion for $(1+x^2)^{-2}$

$$(1+x^2)^{-2} = 1 - 2x^2 + 3x^4 - 4x^6 + 5x^8 - 6x^{10} + \dots$$

7. Find the first five non-zero terms of the infinite series expansion for $\frac{1}{1-x-x^2}$

$$\frac{1}{1-x-x^2} = 1 + x + 2x^2 + 3x^3 + 5x^4 + 8x^5 + \dots$$

8. Find the first five non-zero terms of the infinite series expansion for $\frac{1+x}{4-x^2}$

$$\frac{1+x}{4-x^2} = \frac{1}{4} + \frac{1}{4}x + \frac{1}{16}x^2 + \frac{1}{16}x^3 + \frac{1}{64}x^4 + \frac{1}{64}x^5 + \dots$$