U6 Chapter 4

Binomial Expansion

Chapter Overview

1. Binomial Series Recap

2. Binomial Expansion for negative/fractional powers

3. Constant is not 1:

4. Using Partial Fractions



The Binomial Series: Recap

Recall that if n is a positive integer

Also

Examples

1. Expand up to and including the term in

2. Expand up to and including the term in

Binomial Expansion for Negative/ Fractional Powers

Example

1. Use the binomial expansion to find the first four terms of

2. Use the binomial expansion to find the first four terms of

An infinite expansion is valid if

An infinite expansion is valid if

Quickfire Examples:

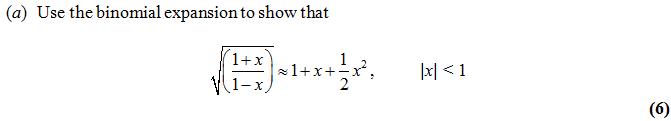
1. Expansion of valid if:

2. Expansion of valid if:

3. Expansion of valid if:

4. Expansion of valid if:

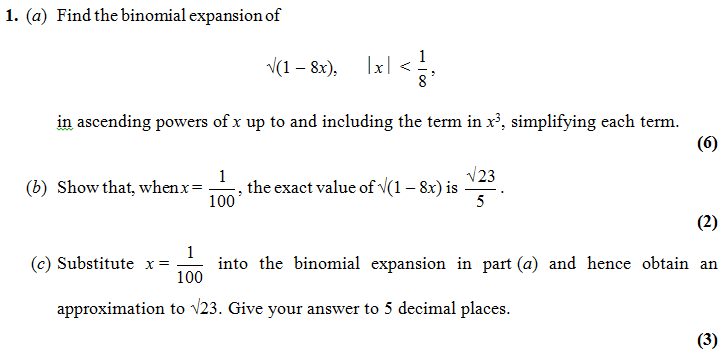
Combining Expansions

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Test Your Understanding

1. Find the binomial expansion of up to an including the term in . State the values of for which the expansion is valid.

2.



Extension

[STEP I 2011 Q6] Use the binomial expansion to show that the coefficient of in the expansion of is .

1. Show that the coefficient of in the expansion of is and hence find the sum of the series
2. Find the sum of the series

Exercise 4A Page 96-97

Dealing with

Remember

Examples

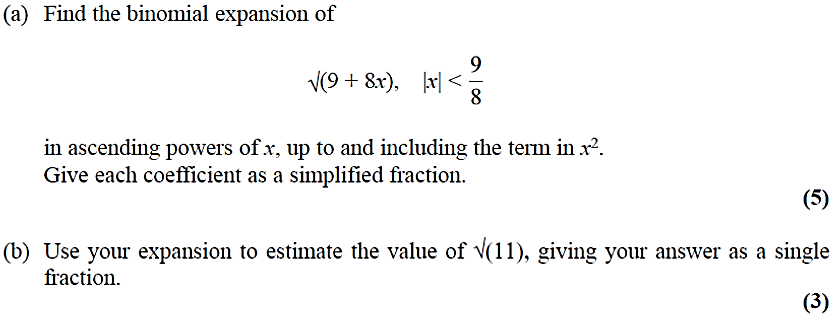
1. Find first four terms in the binomial expansion of . State the values of for which the expansion is valid.

Quickfire First Step

What would be the first step in finding the Binomial expansion of each of these?

|  |  |  |
| --- | --- | --- |
|  | First Step… | Valid when? |
| 1. |  |  |
| 2. |  |  |
| 3. |  |  |
| 4. |  |  |
| 5. |  |  |

Test Your Understanding



**Extension**

[AEA 2006 Q1]

1. For , write down the binomial series expansion of in ascending powers of up to and including the term in .
2. Hence, or otherwise, show that  
   can be written in the form . Write down the values of the integers and .
3. Find the set of values of for which the series in part (b) is convergent.

Exercise 4B Page 99

Using Partial Fractions

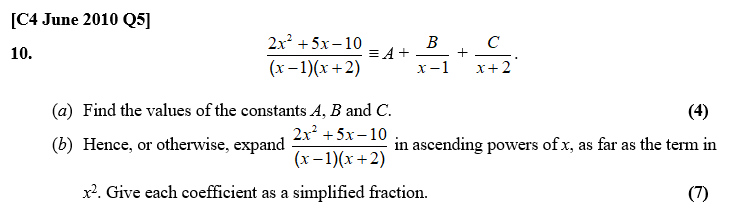
Example

1.

1. Express as partial fractions.
2. Hence show that the cubic approximation of is

c) State the range of values of for which the expansion is valid.

Test Your Understanding



Exercise 4C Page 102