1.11 Maclaurin Series: 10-minute Pack

EDEXCEL 9FM0 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The function f(x) = cos x is to be expanded as a Maclaurin series.

(a) By finding successive derivatives of f(x) = cos x, find the values of f(0), f'(0), f''(0), f'''(0), f''''(0), f'''''(0) and f''''''(0). **(2)**

(b) Hence show that the Maclaurin series for cos x, up to and including the term in x^6, is $1 - x^2/2 + x^4/24 - x^6/720$. **(3)**

(c) Write down the general term of the series, and state the values of x for which the expansion is valid. **(2)**

(Total for Question 1 is 7 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 1.11 Maclaurin Series: 10-minute Pack

Question 1

(a) derivatives cycle cos x, -sin x, -cos x, sin x with correct signs oe **B1**

(a) all seven values correctly stated as 1, 0, -1, 0, 1, 0, -1 **B1**

(a) Answer: f(0)=1, f'(0)=0, f''(0)=-1, f'''(0)=0, f''''(0)=1, f'''''(0)=0, f''''''(0)=-1

(b) uses $f(x) = f(0) + f'(0)x + f''(0)x^2/2! + ... + f''''''(0)x^6/6!$ oe **M1**

(b) correct series with values substituted, odd-power terms vanish **A1**

(b) cso: $1 - x^2/2 + x^4/24 - x^6/720$ as required **A1**

(b) Answer: $\cos x = 1 - x^2/2 + x^4/24 - x^6/720$

(c) general term $(-1)^n x^{2n}/(2n)!$ oe **B1**

(c) valid for all real x cao **B1**

(c) Answer: General term $(-1)^n x^{2n}/(2n)!$; valid for all real x

© Revision Library | revisionlibrary.co.uk