Advanced Higher Maths

Differentiation

2001

Differentiate with respect to x $g(x) = e^{\cot 2x}$, $o < x < \frac{\pi}{2}$. **(2 marks)**

2002

Given that $f(x) = \sqrt{x}e^{-x}$, $x \geq 0$, obtain and simplify $f'(x)$. **(4 marks)**

2003

Given $f(x) = x(1+x)^{10}$, obtain $f'(x)$ and simplify your answer. **(3 marks)**

2004

Given $f(x) = \cos^2 xe^{\tan x}, \frac{-\pi}{2} < x < \frac{\pi}{2}$, obtain $f'(x)$ and evaluate $f'\left(\frac{\pi}{4}\right)$. **(3,1 marks)**

2005

(a) Given $f(x) = x^3 \tan 2x$, where $0 < x < \frac{\pi}{4}$, obtain $f'(x)$. **(3 marks)**

(b) For $y = \frac{1+x^2}{1+x}$, where $x \neq -1$, determine $\frac{dy}{dx}$ in simplified form. **(3 marks)**

2006

Differentiate, simplifying your answer: $\frac{1+\ln x}{3x}$, where $x > 0$. **(3 marks)**

2007

Obtain the derivative of the function $f(x) = \exp(\sin 2x)$. **(3 marks)**

2009

Given $f(x) = (x+1)(x-2)^3$, obtain the values of x for which $f'(x) = 0$. **(3 marks)**

2010

Differentiate the following functions

(a) $f(x) = e^x \sin x^2$. **(3 marks)**

(b) $g(x) = \frac{x^3}{1+\tan x}$. **(3 marks)**

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2011

Given $f(x) = \sin x \cos^3 x$, obtain $f'(x)$. **(3 marks)**

2012

(a) Given $f(x) = \dfrac{3x+1}{x^2+1}$, obtain $f'(x)$. **(3 marks)**

(b) Let $g(x) = \cos^2 x \exp(\tan x)$. Obtain an expression for $g'(x)$ and simplify your answer. **(4 marks)**

2013

Differentiate $f(x) = e^{\cos x} \sin^2 x$. **(3 marks)**

2014

Given $f(x) = \dfrac{x^2-1}{x^2+1}$, obtain $f'(x)$ and simplify your answer. **(3 marks)**

2015

(a) For $y = \dfrac{5x+1}{x^2+2}$, find $\dfrac{dy}{dx}$. Express your answer as a single, simplified fraction. **(3 marks)**

(b) Given $f(x) = e^{2x} \sin^2 3x$, obtain $f'(x)$. **(3 marks)**