11.1 Revision

Marks Available: 40

Table of Standard Derivatives

f(x)	f'(x)	In Formula Book?
χ^n	$n x^{n-1}$	No
e^{x}	e^{x}	No
ln x	$\frac{1}{x}$	No
sin x	cos x	No
cos x	$-\sin x$	No
tan x	$sec^2 x$	Yes
csc x	$-\csc x \cot x$	Yes
sec x	sec x tan x	Yes
cot x	$-csc^2x$	Yes
arcsin x	$\frac{1}{\sqrt{1-x^2}}$	Yes
arccos x	$-\frac{1}{\sqrt{1-x^2}}$	Yes
arctan x	$\frac{1}{1+x^2}$	Yes

Question 1

Differentiate each of the following with respect to *x*,

$$(\mathbf{i}) \qquad y = 7x^4$$

$$(\mathbf{ii}) \qquad y = 11\sqrt{x}$$

[2 marks]

Question 2

By first expanding the brackets, differentiate each of the following with respect to *x*,

(i)
$$y = (x+6)(2x-5)$$

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 (ii) $y = \sqrt{x} \left(\frac{1}{\sqrt{x}} + 3\sqrt{x}\right)$

Use The Chain Rule to differentiate each of the following with respect to *x*,

(i)
$$y = 4(x^3 + 3)^5$$

$$(ii) y = 4\cos(2x)$$

(iii)
$$y = sec^3 x$$

$$(iv) y = e^{\sin x} + e^{\cos x}$$

[8 marks]

Question 4

(i) Use The Product Rule to find
$$\frac{dy}{dx}$$
 if $y = x \ln x$

[2 marks]

(ii) Find also
$$\frac{d^2y}{dx^2}$$

Consider the function

$$f(x) = tan(3x)$$

Determine the value of

$$f'\left(\frac{\pi}{18}\right)$$

[4 marks]

Question 6

Use The Quotient Rule to show that if $y = \frac{x^3 - 1}{x^3 + 1}$

then
$$\frac{dy}{dx} = \frac{6x^2}{(x^3 + 1)^2}$$

Find the equation of the tangent to the curve $y = \frac{11}{x^2 - 3}$ when x = 5 Give the answer in the form ax + by + c = 0 where a, b and c are integers to be found.

The function f(x) is given below

$$f(x) = \frac{x^2 \sin(2x)}{9\pi}$$

- (i) Find f'(x)
- (ii) Show that $f'\left(\frac{\pi}{4}\right) = \frac{1}{18}$

If

$$\frac{d}{dx}\left(\ln\sqrt{ax+b}\right) = \frac{4}{ax+1}$$

Find the values of a and b.

[4 marks]