CHEMISTRY ONLINE
TUITION

Phone: +442081445350

www.chemistryonlinetuition.com

Email:asherrana@chemistryonlinetuition.com

PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)
TOPIC:	DIFFERENTIATION
PAPER TYPE:	SOLUTION - 12
TOTAL QUESTIONS	8
TOTAL MARKS	43

Differentiation - 12

1)

First, identify the inner function and its derivative. In this case, the inner function is $u(x) = 5x^2 – 2x + 3$, and its derivative is $u'(x) = 10x – 2$.

Next, differentiate the outer function $\sqrt{u}$ with respect to u, which gives us $\frac{1}{2\sqrt{u}}$.

Finally, apply the chain rule by multiplying the derivative of the outer function with the derivative of the inner function:

$f'(x) = \frac{1}{2\sqrt{5x^2-2x+3}} \cdot (10x – 2)$

Simplifying, we get:

$f'(x) = \frac{10x-2}{2\sqrt{5x^2-2x+3}}$

So, the derivative of $f(x) = \sqrt{5x^2 - 2x + 3}$ is $f'(x) = \frac{10x-2}{2\sqrt{5x^2-2x+3}}$

2)

First, identify the inner function and its derivative. In this case, the inner function is $u(x) = 3x^2 – x$, and its derivative is $u'(x) = 6x – 1$.

Next, differentiate the outer function tan(u) with respect to u, which gives us $\sec^2(u)$.

Finally, apply the chain rule by multiplying the derivative of the outer function with the derivative of the inner function:

$g(x) = \sec^2(3x^2 – x) \cdot (6x – 1)$

So, the derivative of $g(x) = \tan(3x^2 – x)$ is $g'(x) = (6x – 1) \sec^2(3x^2 – x)$.

3)

First, identify the inner function and its derivative. In this case, the inner function is $u(x) = 2x^2 – x + 1$, and its derivative is $u'(x) = 6x^2 – 1$.

Next, differentiate the outer function $\sqrt{u}$ with respect to u, which gives us $\frac{1}{2\sqrt{u}}$.

Finally, apply the chain rule by multiplying the derivative of the outer function with the derivative of the inner function:

$f'(x) = \frac{1}{2\sqrt{2x^2 - x + 1}} \cdot (6x^2 - 1)$

Simplifying, we get:

$f'(x) = \frac{6x^2 - 1}{2\sqrt{2x^2 - x + 1}}$

So, the derivative of $f(x) = \sqrt{2x^3 - x + 1}$ is $f'(x) = \frac{6x^2 - 1}{2\sqrt{2x^3 - x + 1}}$

4)

First, identify the inner function and its derivative in this case, the inner function is $u(x) = 2x^2 + 4x$, and its derivative is $u'(x) = 4x + 4$.

Next, differentiate the outer function cos(u) with respect to u, which gives us – sin(u).

Finally, apply the chain rule by multiplying the derivative of the outer function with the derivative of the inner function:

$y'(x) = -\sin(2x^2 + 4x) \cdot (4x + 4)$

So, the derivative of $y(x) = \cos(2x^2 + 4x)$ is $y'(x) = -(4x + 4)\sin(2x^2 + 4x)$.

5)

To find the derivative of $f(x)$, we apply the chain rule. First, identify the inner function and its derivative. In this case, the inner function is u(x) = 4x2 + 3x, and its derivative is $u'(x) = 8x + 3$.

Next, differentiate the outer function cos(u) with respect to u, which gives us – sin(u).

Finally, apply the chain rule by multiplying the derivative of the outer function with

the derivative of the inner function:

$f'(x) = -\sin(4x^2 + 3x) \cdot (8x + 3)$

So, the derivative of $f(x)$ = cos (4x2 + 3x) is $f'(x)$ = - (8x + 3) sin (4x2 + 3x).

6)

First, identify the inner function and its derivative. In this case, the inner function is u(x) = -2x^2 + 5x, and its derivative is u'(x) = -4x + 5.

Next, differentiate the outer function e^u with respect to u, which gives us e^u.

Finally, apply the chain rule by multiplying the derivative of the outer function with the derivative of the inner function:

Y'(x) = e^{2x^2+5x} . (-4x + 5)

So, the derivative of y(x) = e^{2x^2+5x} is y'(x) = (-4x + 5) e^{2x^2+5x}.

7)

First, identify the inner function and its derivative. In this case, the inner function is u(x) = 3x^2 + 2x + 1, and its derivative is u'(x) = 6x + 2.

Next, differentiate the outer function $\sqrt{u}$ with respect to u, which gives us $\frac{1}{2\sqrt{u}}$

Finally apply the chain rule by multiplying the derivative of the outer function with the derivative of the inner function:

f'(x) = $\frac{1}{2\sqrt{3x^2+2x+1}}$. (6x + 2)

Simplifying, we get:

f'(x) = $\frac{6x+2}{2\sqrt{3x^2+2x+1}}$

So, the derivative of f(x) = $\sqrt{3x^2+2x+1}$ is f'(x) = $\frac{6x+2}{2\sqrt{\sqrt{3x^2+2x+1}}}$.

8)

First, identify the inner function and its derivative. In this case, the inner function is $u(x) = 4x^2 – 3x + 1$, and its derivative is $u'(x) = 8x – 3$.

Next, differentiate the outer function ln(u) with respect to u, which gives us $\frac{1}{u}$.

Finally, apply the chain rule by multiplying the derivative of the outer function with the derivative of the inner function:

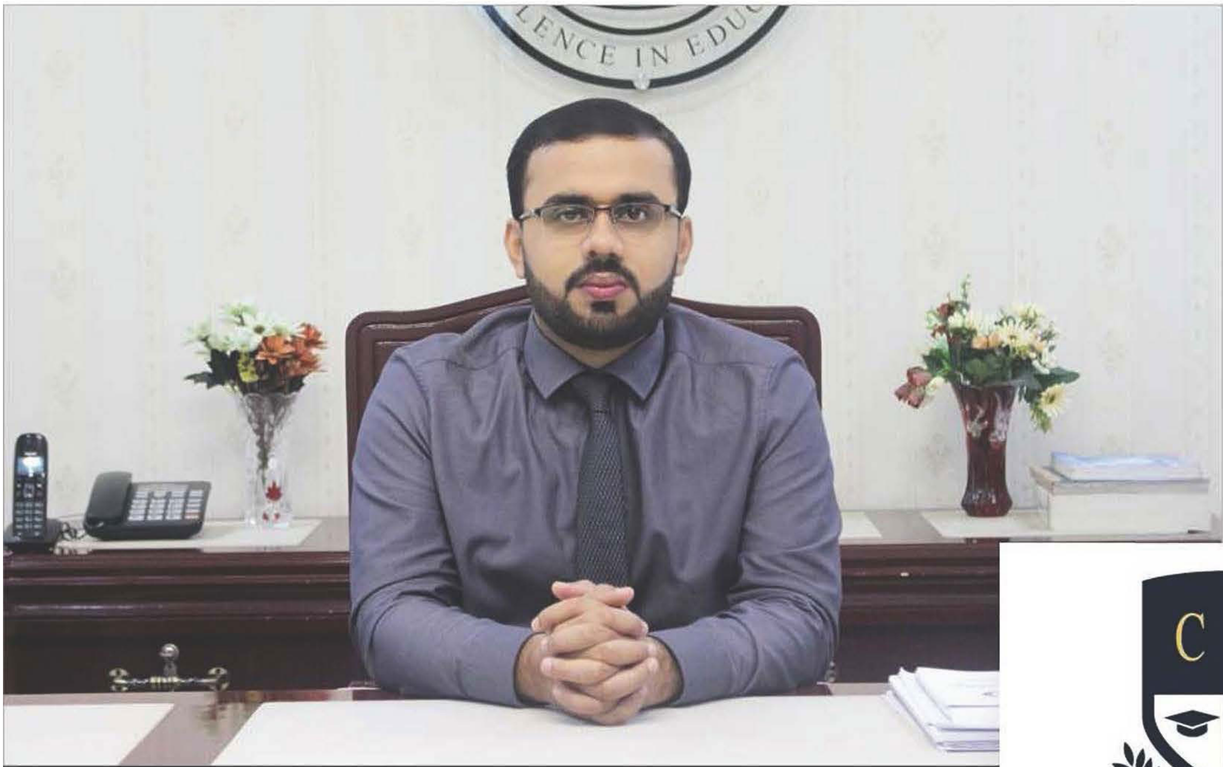
$y'(x) = \frac{1}{4x^2-3x+1} . (8x – 3)$

Simplifying, we get:

$y'(x) = \frac{8x-3}{4x^2-3x+1}$

So, the derivative of y(x) = ln(4x2 – 3x + 1) is $y'(x) = \frac{8x-3}{4x^2-3x+1}$

www.chemistryonlinetuition.com asherrana@chemistryonlinetuition.com



DR. ASHAR RANA

CHEMISTRY ONLINE
TUITION
Phone: +442081445350
www.chemistryonlinetuition.com
Email: asherrana@chemistryonlinetuition.com

- Founder & CEO of Chemistry Online Tuition Ltd.
- Tutoring students in UK and worldwide since 2008
- Chemistry, Physics, and Math's Tutor

CONTACT INFORMATION FOR
CHEMISTRY ONLINE TUITION

- UK Contact: 02081445350
- International Phone/WhatsApp: 00442081445350
- Website: www.chemistryonlinetuition.com
- Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK