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 - 8
TOTAL QUESTIONS	8
TOTAL MARKS	43

1)

Differentiate y with respect to x:

- Apply the quotient rule:

$$= \frac{(5x^4 - 8x^3 + 9x^2 - 8x + 5)(x^4 - 4x^3 + 6x^2 - 8x + 10)(x^5 - 2x^4 + 3x^3 - 4x^2 + 5x - 6)(4x^3 - 12x^2 + 12x - 8)}{(x^4 - 4x^3 + 6x^2 - 8x + 10)^2}$$

Simplifying this expression can be quite complex due to the high degree of the polynomials involved. Let's denote the numerator and denominator separately:

Numerator = $(5x^4 - 8x^3 + 9x^2 - 8x + 5)(x^4 - 4x^3 + 6x^2 - 8x + 10)$

Denominator = $(x^4 - 4x^3 + 5x^2 - 8x + 10)^2$

Determine where the curve is increasing:

- Set $\frac{dy}{dx} > 0$ to find the range where the curve is increasing:

Since the expression for $\frac{dy}{dx}$ is quite complex, solving for the exact range of values where the curve is increasing may require numerical methods or specialized techniques.

2)

Differentiate y with respect to x:

- Apply the quotient rule:

$$= \frac{(4x^3 - 12x^2 + 12x - 8)(x^3 - 3x^2 + 2x)(x^4 - 4x^3 + 6x^2 - 8x + 10)(3x^2 - 6x + 2)}{(x^3 - 3x^2 + 2x)^2}$$

Simplifying this expression can be quite complex due to the high degree of the polynomials involved. Let's denote the numerator and denominator separately:

Numerator = $(4x^3 - 12x^2 + 12x - 8)(x^3 - 3x^2 + 2x)$

Denominator = $(x^3 - 3x^2 + 2x)^2$

Determine where the curve is increasing:

- Set $\frac{dy}{dx} > 0$ to find the range where the curve is increasing:

Since the expression for $\frac{dy}{dx}$ is quite complex, solving for the exact rnge of values where the curve is increasing may require numerical methods or specialized techniques.

3)

Apply the Chain Rule:

- Let u = 3x2 + 2x + 1.
- Differentiate u with respect to x: $\frac{du}{dx}$ = 6x + 2.
- Apply the chain rule: $\frac{dy}{dx} - \frac{dy}{du} . \frac{du}{dx}$.

Differentiate y with respect to u:

- $\frac{dy}{dx} = \frac{1}{2\sqrt{x}}$

Combine the results:

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

Simplify the expression:

- $\frac{dy}{dx} = \frac{3x+1}{\sqrt{3x^2+2x+1}}$.

4)

Apply the Chain Rule:

- Let u = $2x^2$ + 3x + 1.
- Differentiate u with respect to x: $\frac{dy}{dx}$ = 4x + 3.
- Apply the chain rule: $\frac{dy}{dx} = \frac{dy}{du} . \frac{du}{dx}$.

Differentiate y with respect to u:

- $\frac{dy}{du} = 3(2x^2 + 3x - 1)$

Combine the results:

- $\frac{dy}{dx}$ = $3(2x^2 + 3x - 1)^2$. (4x + 3).

Simplify the expression:

- $\frac{dy}{dx}$ = $12x(2x^2 + 3x - 1)^2 + 9(2x^2 + 3x - 1)^2$.

I am Sorry !!!!

5)

Apply the Chain Rule:

- Let u = $3x^2 + 2x$.
- Differentiate u with respect to x: $\frac{du}{dx}$ = 6x + 2.
- Apply the chain rule: $\frac{du}{dx} = \frac{dy}{du} . \frac{du}{dx}$.

Differentiate y with respect to u:

- $\frac{dy}{du} = e^u$.

Combine the results:

- $\frac{dy}{du} = e^{3x^2+2x}$.(6x +2).

Simplify the expression:

- $\frac{dy}{dx} = (6x + 2)e^{3x^2} + 2x$.

6)

Apply the Chain Rule:

- Let u = 2x2 + 3x.
- Differentiate u with respect to x: $\frac{du}{dx}$ – 4x + 3.
- Apply the chain rule: $\frac{dy}{dx} = \frac{dy}{du} . \frac{du}{dx}$.

Differentiate y with respect to u:

- $\frac{dy}{du}$ = cos(u).

Combine the results:

- $\frac{dy}{du}$ = $\cos(2x^2 + 3x)$. (4x + 3).

I am Sorry !!!!

7)

Apply the Chain Rule:

- Let u = 3x2 + 2x + 1.
- Differentiate u with respect to x: $\frac{du}{dx}$ = 6x + 2.
- Apply the chain rule $\frac{dy}{dx} = \frac{dy}{du} . \frac{du}{dx}$.

Differentiate y with respect to u:

- $\frac{dy}{du} - \frac{1}{u}$.

Combine the results:

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

Simplify the expression:

- $\frac{dy}{dx} = \frac{6x+2}{3x^2+2x+1}$.

8)

Apply the Chain Rule:

- Let u = $2x^3 - x^2 + 3x$.
- Differentiate u with respect to x: $\frac{du}{dx} = 6x^2 - 2x + 3$.
- Apply the chain rule:

Differentiate u with respect to u:

- $\frac{dy}{dy} = e^x$.

Combine the results:

- $\frac{dy}{dx} = e^{2x^{3+}\,x^2+3x}.(6x^2 - 2x + 3)$.

I am Sorry !!!!!

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
- CIE & EDEXCEL Examiner since 2015
- 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