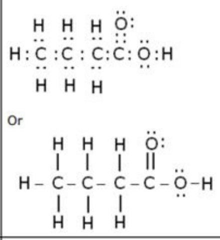
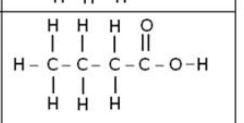
Derivatives pdf notes

3. Structural representation of Organic compounds:

	Example:
Lewis structure : In this representation bond between atoms are represented by pairs of dots or lines and lone pairs on atoms are represented by a pairs of dots	
Complete structural Formula: In this representation, a single bond is represented by single dash (-), double bond by double dash (=) and triple bond by triple dash (≡).Lone pair may or may not be shown on heteroatoms (for e.g. N, S, O etc.)	
Condensed structural formula: In this representation atoms are shown but bonds (dashes) between some or all atoms may be omitted and number of identical groups attached to an atom are indicated by a subscript	$CH_3CH_2CH_2COOH$ or $CH_3(CH_2)_2COOH$
Bond-line structural formula:	

$$
\begin{aligned}
f'(x) &= 2x \text{ when } (x < -3) \\
&= -2x \text{ when } (-3 < x < 3) \\
&= 2x \text{ when } (x > 3) \\
f''(x) &= 2 \text{ when } (x < -3) \\
&= -2 \text{ when } (-3 < x < 3) \\
&= 2 \text{ when } (x > 3)
\end{aligned}
$$

- **Clearly, there is no solution for f''(x) = 0.**
- **Note that - 3 and 3 are in the domain of f but are not in the the domain of f''; hence, x = -3 and x = 3 are the only possible candidates for inflection points.**
- **Testing:**

x < -3	f''(-5) = 2	f is concave upward
-3 < x < 3	f''(0) = -2	f is concave downward
x > 3	f''(1) = 2	f is concave upward

- **Therefore, x = -3 and x = 3 are inflection points.**
- **We are given the function**

$$f(x) = x^2e^x$$

- **First, we find the first and second derivatives:**

$$
\begin{aligned}
f'(x) &= x^2e^x + e^x2x \\
&= e^x(x^2 + 2x) \\
f''(x) &= e^x(2x + 2) + (x^2 + 2x)e^x \\
&= e^x(x^2 + 4x + 2)
\end{aligned}
$$

- **We set the second derivative equal to 0 and solve:**

S. No.	Function	Substitution
(i)	$(a^2 + x^2), \sqrt{x^2 + a^2}, \frac{1}{\sqrt{x^2 + a^2}}$	$x = a\tan\theta$ or $a\cot\theta$ or $a\sinh\theta$
(ii)	$(a^2 - x^2), \sqrt{a^2 - x^2}, \frac{1}{\sqrt{a^2 - x^2}}$	$x = a\sin\theta$ or $a\cos\theta$
(iii)	$(x \pm \sqrt{x^2 \pm a^2})^n$	expression indside the bracket $= t$
(iv)	$\frac{2x}{a^2 - x^2}, \frac{2x}{a^2 + x^2}, \frac{a^2 - x^2}{a^2 + x^2}$	$x = a\tan\theta$
(v)	$\frac{1}{(x + a)^{1-\frac{1}{n}}(x + b)^{1+\frac{1}{n}}}$ $(n \in N, n > 1)$	$\frac{x + a}{x + b} = t$
(vi)	$(x^2 - a^2), \sqrt{x^2 - a^2}, \frac{1}{\sqrt{x^2 - a^2}}$	$x = a\sec\theta$ or $a\,\text{cosec}\,\theta$ or $a\cosh\theta$
(vii)	$\sqrt{\frac{a - x}{a + x}}$ or $\sqrt{\frac{a + x}{a - x}}$	$x = a\cos 2\theta$
(viii)	$\sqrt{\frac{x - \alpha}{\beta - x}}$ or $\sqrt{(x - \alpha)(\beta - x)}$	$x = \alpha\cos^2\theta + \beta\sin^2\theta$
(ix)	$\sqrt{2ax - x^2}$	$x = a(1 - \cos\theta)$
(x)	$\sqrt{\frac{x}{a + x}}, \sqrt{\frac{a + x}{x}}, \sqrt{x(a + x)},$	$x = a\tan^2\theta$ or $a\cot^2\theta$
(xi)	$\sqrt{\frac{x}{a - x}}; \sqrt{\frac{a - x}{x}}, \sqrt{x(a - x)}, \frac{1}{\sqrt{x(a - x)}}$	$x = a\sin^2\theta$ or $a\cos^2\theta$
(xii)	$\sqrt{\frac{x}{x - a}}; \sqrt{\frac{x - a}{x}}, \sqrt{x(x - a)}, \frac{1}{\sqrt{x(x - a)}}$	$x = a\sec^2\theta$ or $a\,\text{cosec}^2\,\theta$

Finding u′ & v′

u = x + 1

u′ = 1 + 0 = 1

v = x

v′ = 1

Now,

$$f'(x) = \left(\frac{u}{v}\right)'$$

$$= \frac{u'v - v'u}{v^2}$$

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

$$= \frac{x - x - 1}{x^2}$$

$$= \frac{-1}{x^2}$$

$$= \lim_{h \to 0} \frac{h + \frac{x - (x - h)}{(x + h)(x)}}{h}$$

$$= \lim_{h \to 0} \frac{h + \frac{(-h)}{(x + h)x}}{h}$$

$$= \lim_{h \to 0} \frac{h\left(1 - \frac{1}{(x + h)x}\right)}{h}$$

$$= \lim_{h \to 0} \left(1 - \frac{1}{(x + h)x}\right)$$

Putting h = 0

$$= \left[1 - \frac{1}{x(x + 0)}\right]$$

$$= \mathbf{1 - \frac{1}{x^2}}$$

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The conclusion is that there is at least one point between A and B, such that the tangent to the graph A (C, F (C)) is parallel to the X axis. 5. The 2nd derivative must be zero or 2 Â ° derivative change sign in the district of the point of inflection. So, Ã ¢ â‚¬ â ¢ Â «" Y = absolute error to measure y Ã ¢ â‚¬ â ¢ (Ãž "y / y) = Relative error in measurement y Ã ¢ â‚¬ â ¢ (Ãž "y / y) * 100 = percentage error to measure y monotonicity of functions 1. A function f (x) can have several minimum maximum and local local values in an interval. Point x = a is called a point of minimum of function f (x) ef (a) is known as minimum value or minimum value or absolute minimum value of f (x). 5. Therefore, the average change rate = (Ãž "y / ã Ž "t) when the limit is applied to Ãž" tÃ, â € œ 0, the change rate becomes instantaneous and we obtain the change rate compared to instant x. The important connections a minimum value at a certain point could also Be greater than a maximum value in someone else. The points to which a function reaches the maximum local value or the minimum local values are known as the extreme points or rotation points and both the maximum minimum local values and the local ones are called the extreme values of f (x). Property of the monotonous functions 1. Methods to find the venue 1. To find the range of a continuous function leaves that F (X) is a continuous function on [A, B], such that its minimum value in [A, B1 Both the maximum value in [A, B] is M. Thus, the differential coefficient of Y compared to X IE, (DY / DX) is nothing but the y rise rate relative to X. If f (x) is strictly increasing the function to [A, B], such that it is continuous, then F-1 is continuously on [F (A), F (B)]. The maximum and minimum values of a function f (x) can occur only at critical points. Notes for maths for class 12 Download PDF Application derivatives â €) A (f â € "â â â â ¢ ¢ ¢ ¢ ¢ â â â â â â â â â â â â â â € € â‰ž â € € âžž â â Ãã ¢ x € â € â € â € ¢) x (F Mumminim Lacol .muminim Ri.mumnim Links,. 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