Session 11

Fakhir

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Solutions

(a)

$$\begin{aligned}
\frac{d}{dx}\left(\frac{x^3}{x+1}\right) &= \frac{u'v - uv'}{v^2} && (1)\\
&= \frac{3x^2(x+1) - x^3(1)}{(x+1)^2} && (2)\\
&= \frac{x^2(2x+3)}{(x+1)^2} && (3)
\end{aligned}$$

(b)

$$\begin{aligned}
\frac{d}{dx}\left(x^3.(x+1)^{-1}\right) &= u'v + uv' && (4)\\
&= 3x^2(x+1)^{-1} + x^3.(-1)(x+1)^{-2} && (5)\\
&= \frac{3x^2}{(x+1)} - \frac{x^3}{(x+1)^2} && (6)\\
&= \frac{3x^2(x+1) - x^3(1)}{(x+1)^2} && (7)\\
&= \frac{x^2(2x+3)}{(x+1)^2} && (8)
\end{aligned}$$

(c)

$$\begin{aligned}
\frac{d}{dx}u(x)(v(x))^{-1} &= u'(x)(v(x))^{-1} + u(x).(-1)(v(x))^{-2}.v'(x) && (9)\\
&= \frac{u'(x)}{v(x)} - \frac{u(x)v'(x)}{(v(x))^2} && (10)\\
&= \frac{u'(x)v(x) - u(x)v'(x)}{(v(x))^2} && (11)
\end{aligned}$$