Practicing the product rule

TOTAL POINTS 6

1.Question 1

In this quiz you'll have some practice using the product rule alongside the rules you've already learned.

In the previous video we considered the product of two functions, $A(x) = f(x)g(x)$, and saw that its derivative is given by $A'(x) = f'(x)g(x) + f(x)g'(x)$.

Which of the following is the product rule in d/dx notation?

1 / 1 point

- $d/dx\ A(x) = d/dx\ f(x)g(x) + d/dx\ g(x)f(x)$
- $dxdA(x)=dxdf(x)dxdg(x)+f(x)g(x)$
- $dxdA(x)=dxdf(x)dxdg(x)$
- $dxdA(x)=dxdf(x)g(x)−f(x)dxdg(x)$

2.Question 2

When using the product rule it may help to consider how the function can be broken up into two parts, which can then be labelled $f(x)$ and $g(x)$. Use this method to differentiate the function $A(x) = (x+2)(3x-3)$ with respect to x.

1 / 1 point

- $A'(x) = 6x+3$
- $A'(x) = 3$
- $A'(x) = 3x+3$
- $A'(x) = 3x+6$

3.Question 3

Remember that how we choose to label the function, $A(x)$ or $u(x)$ or $f(x)$, is not important. The key is to see if the function can be written as a product of two functions, and if so, use the product rule.

Differentiate the function $f(x) = x^3 \sin(x)$ with respect to x.

1 / 1 point

- $f'(x) = x^3 \sin(x) + 3x^2 \cos(x)$
- $f'(x) = x^3 \sin(x) - 3x^2 \cos(x)$
- $f'(x) = 3x^2 \sin(x) - x^3 \cos(x)$
- $f'(x) = 3x^2 \sin(x) + x^3 \cos(x)$

4.Question 4

Using the same approach, differentiate the function $f(x) = e^x/x$ with respect to x.

1 / 1 point

- f'(x) = e^x/x
- f'(x) = e^x(1/x + 1/x^2)
- f'(x) = e^x(1/x – 1/x^2)
- f'(x) = -e^x/x^2

5.Question 5

We can extend the product rule to products of more than two functions.

Consider the function $u(x) = f(x)g(x)h(x)$. Substitute $A(x) = f(x)g(x)$ and then use the product rule *twice* to find the expression for $u'(x)$. This is the product rule for a product of three functions!

1 / 1 point

- u'(x) = f'(x)g(x)h(x) + f(x)g'(x)h(x) + f(x)g(x)h'(x)
- u'(x) = f'(x)g'(x)h'(x)
- u'(x) = f(x)g(x)h'(x) + f'(x)g'(x)h(x)
- u'(x) = [f'(x)g(x) + f(x)g'(x)]h'(x)

6.Question 6

Using your answer to the previous question, differentiate the function $f(x) = x\ e^x \cos(x)$ with respect to x.

1 / 1 point

- f'(x) = e^x[(x+1) cos(x) - x sin(x)]
- f'(x) = e^x(x cos(x) - sin(x))
- f'(x) =-(1+x)e^x sin(x)
- f'(x) = -e^x sin(x)