Quiz 3A, Business Calculus

Spring 2017 - Dr. Graham-Squire

Name: Key

1. (3 points) Use derivative rules to calculate the derivative. Simplify your answer, if possible.

$$f(x) = \frac{x^7 - 3x^4}{\left(\frac{1}{x}\right)}$$

$f(x) = (x^7 - 3x^4)\frac{x}{1}$

$f(x) = x^8 - 3x^5$

$f'(x) = 8x^7 - 15x^4$

or

$$\frac{\frac{1}{x}(7x^6 - 12x^3) - (x^7 - 3x^4)(-x^{-2})}{\left(\frac{1}{x}\right)^2}$$

$$= \frac{7x^5 - 12x^2 + x^5 - 3x^2}{\left(\frac{1}{x^2}\right)}$$

$= (8x^5 - 15x^2) \cdot \left(\frac{x^2}{1}\right)$

$= 8x^7 - 15x^4$

2. (4 points) Calculate the derivative using derivative rules. You do NOT need to simplify your answer (though you can if you want, for fun).

$$h(x) = \sqrt{7x^2 - 3}(x^3 + 2x + 5)$$

for Product rule

$h(x) = (7x^2-3)^{1/2}(x^3+2x+5)$ ✓ ✓

$h'(x) = \frac{1}{2}(7x^2-3)^{-1/2}(14x)(x^3+2x+5) + (7x^2-3)^{1/2}(3x^2+2)$ ✓ ✓

3. (3 points) State what derivative rules (between the chain, quotient and product rules. You do not need to mention power rule and other such), and in what order, you would use to calculate the derivative below. You do NOT need to actually calculate the derivative, though you can if you want for fun.

$$f(x) = \left(3x^{-2} + 10 + \left(\frac{x^2-7}{(x+1)^4}\right)(2x^3 - 5x)^3\right)^5$$

0.5 for each

0.5 for out of order.

Chain rule first (for the $(\quad)^5$)

then product rule (for $(\frac{\cdots}{\cdots})\cdot(\quad)^3$)

while doing product rule need to do quotient rule and chain rule

for the $\left(\frac{\cdots}{(\cdots)^4}\right)$

and do a chain rule for $(2x^3-5x)^3$

Quiz 3B, Business Calculus

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Name: Key

1. (3 points) State what derivative rules (between the chain, quotient and product rules. You do not need to mention power rule and other such), and in what order, you would use to calculate the derivative below. You do NOT need to actually calculate the derivative, though you can if you want for fun.

$$f(x) = (3x^{-2} + 10) + \left(\frac{x^2 - 7}{(x+1)^4}\right)\left((2x^3 - 5x)(7x^8 - 5x^3 + 1)\right)^3$$

- First do a product rule on the $(\frac{\cdots}{\cdots})\cdot(\cdots)^3$
- When take derivative of 1st $(\frac{\cdots}{(\cdots)^4})$, must do a quotient rule and a chain rule (for $(x+1)^4$)
- When take derivative of $((\cdots)\cdot(\cdots))^3$ must do a chain rule and then a product rule for deriv. of inside function.

−0.5 if order wrong.

$\frac{d}{dx}\left(\frac{1}{x}\right) = \frac{d}{dx}(x^{-1})$

$= -x^{-2}$

2. (3 points) Use derivative rules to calculate the derivative. Simplify your answer, if possible.

$$f(x) = \frac{x^9 - 2x^3}{\left(\frac{1}{x}\right)}$$

$f(x) = (x^9 - 2x^3)\frac{x}{1}$

$f(x) = x^{10} - 2x^4$

$\boxed{f'(x) = 10x^9 - 8x^3}$

or

$\frac{\frac{1}{x}(9x^8 - 6x^2) - (x^9 - 2x^3)(-x^{-2})}{\left(\frac{1}{x}\right)^2}$

$= \frac{9x^7 - 6x + x^7 - 2x}{\left(\frac{1}{x^2}\right)}$

$= (10x^7 - 8x)\left(\frac{x^2}{1}\right)$

$= \boxed{10x^9 - 8x^3}$

3. (4 points) Calculate the derivative using derivative rules. You do NOT need to simplify your answer (though you can if you want, for fun).

$$h(x) = (x^4 - 11)\sqrt{x^2 + 4x - 3}$$

$h(x) = (x^4 - 11)(x^2 + 4x - 3)^{1/2}$

$h'(x) = (4x^3)(x^2 + 4x - 3)^{1/2} + \frac{1}{2}(x^2 + 4x - 3)^{-1/2}(2x + 4)(x^4 - 11)$

↑ for product