Answers: The quotient rule

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Summary

Answers to questions relating to the guide on the quotient rule.

These are the answers to Questions: The quotient rule.

Please attempt the questions before reading these answers!

1.1. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{e^x}{x}\right) = \dfrac{e^x(x-1)}{x^2}$.

1.2. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{e^{7x}}{x^5}\right) = \dfrac{(7x-5)e^{7x}}{x^6}$.

1.3. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{\ln(x)}{x^2}\right) = \dfrac{1-2\ln(x)}{x^3}$

1.4. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{e^{-x}}{x^2+11x-2}\right) = -\dfrac{(x^2+13x+9)e^{-x}}{(x^2+11x-2)^2}$

1.5. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{x^3+5x-5}{x^2+3}\right) = \dfrac{(3x^2+5)(x^2+3)-(x^3+5x-5)(2x)}{(x^2+3)^2}$.

1.6. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{\cos(x)}{x^2+3x-1}\right) = \dfrac{-\sin(x)(x^2+3x-1)-\cos(x)(2x+3)}{(x^2+3x-1)^2}$.

1.7. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{\tan(x)}{\cos(x)}\right) = \dfrac{\sec^2(x)\cos(x) + \tan(x)\sin(x)}{\cos^2(x)}$

1.8. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{\ln(3x)}{\ln(5)+x}\right) = \dfrac{1}{x(\ln(5)+x)} - \dfrac{\ln(3x)}{(\ln(5)+x)^2}$

1.9. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{x^2+3x}{\cos(x)}\right) = \dfrac{(2x+3)\cos(x) + (x^2+3x)\sin(x)}{\cos^2(x)}$

1.10. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{\ln(x)}{x^3+3}\right) = \dfrac{(x^3+3) - 3x^3\ln(x)}{x(x^3+3)^2}$

1.11. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{5\tan(x)}{x}\right) = \dfrac{5x\sec^2(x) - 5\tan(x)}{x^2}.$

1.12. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{3x^7 - 27x^2 + 2\sqrt{x}}{x^2+1}\right) = \dfrac{15x^8\sqrt{x} + 21x^6\sqrt{x} - 54x\sqrt{x} - 4x^2 + x^2 + 1}{\sqrt{x}(x^2+1)^2}..$

1.13. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{e^{-3x}}{e^{2x}}\right) = \dfrac{-3e^{-3x}\,e^{2x} - 2e^{-3x}\,e^{2x}}{e^{4x}} = -5e^{-5x}.$

1.14. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{e^3x^3}{e^x}\right) = \dfrac{3e^{3+x}x^2 - e^{3+x}x^3e^x}{e^{2x}} = \dfrac{x^2e^{x+3}(3+x)}{e^{2x}}.$

1.15. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{x^5}{x^5+1}\right) = \dfrac{5x^4(x^5+1) - x^5(5x^4)}{(x^5+1)^2} = \dfrac{x^4}{(x^5+1)^2}$

1.16. $\dfrac{\mathrm{d}}{\mathrm{d}x}\left(\dfrac{\tan(x)}{\ln(x)}\right) = \dfrac{x\sec^2(x)\ln(x) - \tan(x)}{x(\ln(x))^2}.$

1.17. $$\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{3\sin(x)}{\ln(x)}\right) = \frac{3x\cos(x)\ln(x) - 3\sin(x)}{x(\ln(x))^2}$$

1.18. $$\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{\tan(x)+5x}{\sec(3x)}\right) = \frac{\sec^2(x)+5-(3\tan(3x))(5x+\tan(x))}{\sec(3x)}.$$

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