Quotient Rule Practice Problems

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Differentiate each of the following functions with respect to x using the quotient rule:

1. $f(x) = \frac{\sec(x)}{2x}$
2. $f(x) = \frac{x}{\cos(x)}$
3. $f(x) = \frac{5\tan(x)}{\sqrt{x}}$
4. $f(x) = \frac{2\cot(x)}{x^2-5}$
5. $f(x) = \frac{2x^3}{\frac{1}{2}\csc(x)}$
6. $f(x) = \frac{e^x}{x^2}$
7. $f(x) = \frac{\ln(x)}{2x}$
8. $f(x) = \frac{5x^3}{e^x}$
9. $f(x) = \frac{x^2+1}{\ln(x)}$
10. $f(x) = \frac{5\ln(x)}{\frac{1}{2}e^x}$
11. $f(x) = \frac{x}{x^2+1}$
12. $f(x) = \frac{x^3-5}{\sqrt{x}}$
13. $f(x) = \frac{\sqrt{x}}{2x+1}$
14. $f(x) = \frac{x^5+3x^2-1}{2x}$
15. $f(x) = \frac{x^{3/2}+1}{4x}$

Solutions

1. $f'(x) = \frac{2x \cdot \sec(x)\tan(x) - \sec(x) \cdot 2}{(2x)^2}$
2. $f'(x) = \frac{\cos(x) \cdot 1 + x \cdot \sin(x)}{\cos^2(x)}$
3. $f'(x) = \frac{\sqrt{x} \cdot 5\sec^2(x) - 5\tan(x) \cdot \frac{1}{2\sqrt{x}}}{x}$
4. $f'(x) = \frac{(x^2-5)(-2\csc^2(x)) - 2\cot(x)(2x)}{(x^2-5)^2}$
5. $f'(x) = \frac{\left(\frac{1}{2}\csc(x) \cdot 6x^2 - 2x^3 \cdot \left(-\frac{1}{2}\csc(x)\cot(x)\right)\right)}{\left(\frac{1}{2}\csc(x)\right)^2}$
6. $f'(x) = \frac{e^x \cdot x^2 - e^x \cdot 2x}{x^4}$
7. $f'(x) = \frac{2x \cdot \frac{1}{x} - \ln(x) \cdot 2}{(2x)^2}$
8. $f'(x) = \frac{e^x \cdot 15x^2 - 5x^3 \cdot e^x}{e^{2x}}$
9. $f'(x) = \frac{\ln(x) \cdot 2x - (x^2+1) \cdot \frac{1}{x}}{\ln^2(x)}$
10. $f'(x) = \frac{(0.5e^x)(5/x) - 5\ln(x)(0.5e^x)}{(0.5e^x)^2}$
11. $f'(x) = \frac{(x^2+1)(1) - x(2x)}{(x^2+1)^2}$
12. $f'(x) = \frac{\sqrt{x} \cdot 3x^2 - (x^3-5) \cdot \frac{1}{2\sqrt{x}}}{x}$
13. $f'(x) = \frac{(2x+1) \cdot \frac{1}{2\sqrt{x}} - \sqrt{x} \cdot 2}{(2x+1)^2}$
14. $f'(x) = \frac{2x \cdot (5x^4 + 6x - 0) - (x^5 + 3x^2 - 1) \cdot 2}{(2x)^2}$
15. $f'(x) = \frac{4x \cdot \frac{3}{2}x^{1/2} - (x^{3/2}+1) \cdot 4}{(4x)^2}$