$$\lim_{x \to \infty} \int_{2}^{3} \frac{1}{dx} dy$$

THE CHAIN RULE

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Please Send Questions and Comments to ingrid.stewart@csn.edu. Thank you!

Problem 1:

Find the derivative of $f(x) = (2x - 3)^2$.

Method 1 - Use the *Simple Power Rule* as the primary rule

Method 2 - Use the *General Power Rule* as the primary rule

Problem 2:

Find the derivative of $f(x) = (2x - 3)^{50}$.

Problem 3:

Find the derivative of $f(x) = (3x - 2x^2)^5$.

Problem 4:

Find the derivative of $f(x) = \sqrt[3]{(x^2 - 1)^2}$. Express your answer without negative exponents!

Problem 5:

Find the derivative of $g(t) = \dfrac{-7}{(2t - 3)^2}$.

Method 1 - Use the *Quotient Rule* as the primary rule

Method 2 - Use the *Constant Multiple Rule* as the primary rule

Problem 6:

Find the slope of the line tangent to any point on the graph of $f(x) = x^2 \sqrt{1 - x^2}$.

Problem 7:

Find the derivative of $g(x) = \dfrac{x}{\sqrt[3]{x^2 + 4}}$ using the *Quotient Rule.* Write your answer without negative exponents.

Problem 8:

Find the derivative of $g(t) = \left(\dfrac{3t-1}{t+3}\right)^2$.

Method 1 - Use the *General Power Rule* as the primary rule!

Method 2 - Use the *Quotient Rule* as the primary rule

Problem 9:

Differentiate $y = \sec^5 x$.

Problem 10:

Differentiate $y = \tan^2 x$.

Problem 11:

Differentiate $y = \tan 3x$.

Problem 12:

Differentiate $y = \cot \pi x$.

Problem 13:

Differentiate $y = \sin(2x+3)^4$.

Problem 14:

Differentiate $y = \csc 5x^2$.

Problem 15:

Differentiate $y = (\csc 5x)^2$.

Problem 16:

Differentiate $y = 5(\cos x^4)^3$.

Problem 17:

Differentiate $f(x) = (\ln x)^3$.

Problem 18:

Differentiate $f(x) = \ln(x^2 + 2)$.

Problem 19:

Differentiate $f(x) = \ln\sqrt{x + 1}$.

Problem 20:

Differentiate $f(x) = \ln\left[\dfrac{x(x^2 + 1)^2}{\sqrt{2x^3 - 1}}\right]$.

Problem 21:

Differentiate $f(x) = e^{2x - 1}$.

Problem 22:

Differentiate $f(x) = \dfrac{1}{e^{3/x}}$.

Problem 23:

Differentiate $f(x) = \log(\cos x)$.

Problem 24:

Differentiate $f(x) = 2^{3x}$.

SOLUTIONS
You can find detailed solutions below the link for this problem set!

1. $f'(x) = 8x - 12$	2. $f'(x) = 100(2x - 3)^{49}$
3. $f'(x) = 5(3 - 4x)(3x - 2x^2)^4$	4. $f'(x) = \dfrac{4x}{3(x^2 - 1)^{1/3}}$
5. $g'(t) = \dfrac{28}{(2t - 3)^3}$	6. $f'(x) = \dfrac{2x - 3x^3}{(1 - x^2)^{1/2}}$
7. $g'(x) = \dfrac{x^2 + 12}{3(x^2 + 4)^{4/3}}$	8. $g'(t) = \dfrac{20(3t - 1)}{(t + 3)^3}$
9. $\dfrac{dy}{dx} = 5 \sec^5 x \tan x$	10. $\dfrac{dy}{dx} = 2 \sec^2 x \tan x$
11. $\dfrac{dy}{dx} = 3 \sec^2 3x$	12. $\dfrac{dy}{dx} = -\pi \csc^2 \pi x$
13. $\dfrac{dy}{dx} = 8(2x + 3)^3 \cos(2x + 3)^4$	14. $\dfrac{dy}{dx} = -10x \csc 5x^2 \cot 5x^2$
15. $\dfrac{dy}{dx} = -10 \csc^2 5x \cot 5x$	16. $\dfrac{dy}{dx} = -60x^3 \sin x^4 (\cos x^4)^2$
17. $f'(x) = \frac{3}{x}(\ln x)^2$	18. $f'(x) = \dfrac{2x}{x^2 + 2}$
19. $f'(x) = \dfrac{1}{2(x + 1)}$	20. $f'(x) = \dfrac{1}{x} + \dfrac{4x}{x^2 + 1} + \dfrac{3x^2}{2x^3 - 1}$
21. $f'(x) = 2e^{2x - 1}$	22. $f'(x) = \dfrac{-3}{x^2 e^{3/x}}$
23. $f'(x) = \dfrac{-\sin x}{\ln 10 \cos x}$	24. $f'(x) = (3\ln 2)(2^{3x})$