MATH 122
Derivative Practice

Problem 1.

(a) $\dfrac{d}{dx}\,6$

(b) $\dfrac{d}{dx}\left(-\dfrac{1}{8}\right)$

(c) $\dfrac{d}{dx}\,(8x)$

(d) $\dfrac{d}{dx}(1-9x)$

(e) $\dfrac{d}{dx}(4x^2+x)$

(f) $\dfrac{d}{dx}\,\sqrt[3]{x}$

Problem 2.

(a) $\dfrac{d}{dx}\left(-8x^4+\dfrac{3}{x}\right)$

(b) $\dfrac{d}{dx}\left(\sqrt{x}-\dfrac{1}{\sqrt{x}}\right)$

(c) $\dfrac{d}{dx}\,(2x^{5/7}+9x+6)$

(d) $\dfrac{d}{dx}\,7^x$

(e) $\dfrac{d}{dx}\,\log_7 x$

(f) $\dfrac{d}{dx}\,e^x$

Problem 3.

(a) $\dfrac{d}{dx}\,(\pi^4)$

(b) $\dfrac{d}{dx}\,\ln x$

(c) $\dfrac{d}{dx}\,(x^3e^x)$

(d) $\dfrac{d}{dx}\,(e^x\log_{10}x)$

(e) $\dfrac{d}{dx}\,[(5x-1)\ln x]$

(f) $\dfrac{d}{dx}(6x^4-x)^7$

Problem 4.

(a) $\dfrac{d}{dx}\left(\dfrac{x^2}{4x^2-5}\right)$

(b) $\dfrac{d}{dx}\left(\dfrac{7x-1}{\log_5 x}\right)$

(c) $\dfrac{d}{dx}\left(\dfrac{e^x}{6-x^2}\right)$

(d) $\dfrac{d}{dx}\ln(6x+5)$

(e) $\dfrac{d}{dx}\left(e^{4-x^2}\right)$

(f) $\dfrac{d}{dx}(3x+1)^{12}$

Problem 5.

(a) $\dfrac{d}{dx}(x^5 e^x \ln x)$

(b) $\dfrac{d}{dx}(4x-1)^2 2^x$

(c) $\dfrac{d}{dx}\left(\dfrac{xe^x}{1-x}\right)$

(d) $\dfrac{d}{dx}\log_5(x^2 6^x)$

(e) $\dfrac{d}{dx}\left(\dfrac{1-e^{2x}}{x+1}\right)$

(f) $\dfrac{d}{dx}\left[(3x-1)3^x - \ln(5x)\right]$

Problem 6.

(a) $\dfrac{d}{dx}\left(\dfrac{1}{x}+(6^x-1)^5\right)$

(b) $\dfrac{d}{dx}\left(\dfrac{2x}{x+1}\right)^{11}$

(c) $\dfrac{d}{dx}\left(x^\pi - e^{\log_5 x}\right)^7$

(d) $\dfrac{d}{dx}\left(\dfrac{5^{1-x}}{\log_2(3x)}\right)$

(e) $\dfrac{d}{dx}\left(\pi^x - \log_4\left(\ln(-x)\right) - \dfrac{5}{x^8}\right)$

(f) $\dfrac{d}{dx}\left(\dfrac{(5x-1)^4 e^{3x}}{\log_2(1-2^{-x})}\right)$

Problem 1.

(a) 0

(b) 0

(c) 8

(d) -9

(e) $8x + 1$

(f) $\frac{1}{3}\, x^{-2/3} = \dfrac{1}{3\sqrt[3]{x^2}}$

Problem 2.

(a) $-32x^3 - \dfrac{3}{x^2}$

(b) $\frac{1}{2}x^{-1}2 + \frac{1}{2}x^{-3/2} = \dfrac{1}{2\sqrt{x}} + \dfrac{1}{2\sqrt{x^3}}$

(c) $\frac{10}{7}x^{-2/7} + 9 = \dfrac{10}{7\sqrt[7]{x^2}} + 9$

(d) $7^x \ln 7$

(e) $\dfrac{1}{x \ln 7}$

(f) e^x

Problem 3.

(a) 0

(b) $\dfrac{1}{x}$

(c) $3x^2e^x + x^3e^x$

(d) $e^x \log_{10} x + \dfrac{e^x}{x \ln 10}$

(e) $5 \ln x + \dfrac{5x - 1}{x}$

(f) $7(6x^4 - x)^6(24x^3 - 1)$

Problem 4.

(a) $\dfrac{2x(4x^2 - 5) - 8x \cdot x^2}{(4x^2 - 5)^2}$

(b) $\dfrac{7 \log_5 x - \frac{1}{x \ln 5}(7x - 1)}{(\log_5 x)^2}$

(c) $\dfrac{e^x(6 - x^2) + 2xe^x}{(6 - x^2)^2}$

(d) $\dfrac{6}{6x + 5}$

(e) $-2xe^{4-x^2}$

(f) $36(3x + 1)^{11}$

Problem 5.

(a) $5x^4e^x \ln x + x^5e^x \ln x + \dfrac{x^5e^x}{x}$

(b) $8(4x - 1)2^x + (4x - 1)^2 2^x \ln 2$

(c) $\dfrac{(e^x + xe^x)(1 - x) + xe^x}{(1 - x)^2}$

(d) $\dfrac{2x6^x + x^2 6^x \ln 6}{x^2 6^x \ln 5}$

(e) $\dfrac{-2e^{2x}(x + 1) - (1 - e^{2x})}{(x + 1)^2}$

(f) $3^{x+1} + (3x - 1)3^x \ln 3 - \dfrac{1}{x}$

Problem 6.

(a) $-\dfrac{1}{x^2} + 5(6^x - 1)^4 6^x \ln 6$

(b) $11\left(\dfrac{2x}{x + 1}\right)^{10}\left(\dfrac{2(x + 1) - 2x}{(x + 1)^2}\right)$

(c) $7(x^\pi - e^{\log_5 x})^6\left(\pi x^{\pi-1} - e^{\log_5 x} \cdot \frac{1}{x \ln 5}\right)$

(d) $\dfrac{-5^{1-x} \ln 5 \log_2(3x) - \frac{1}{x \ln 2} \cdot 5^{1-x}}{(\log_2(3x))^2}$

(e) $\pi^x \ln \pi - \frac{1}{\ln(-x) \ln 4} \cdot \frac{1}{x} + \dfrac{40}{x^9}$

(f) $\dfrac{\left(20(5x - 1)^3 e^{3x} + 3(5x - 1)^4 e^{3x}\right) \log_2(1 - 2^{-x}) - \frac{2^{-x} \ln 2}{(1 - 2^{-x}) \ln 2}(5x - 1)^4 e^{3x}}{(\log_2(1 - 2^{-x}))^2}$