Suggested Homework for Lecture 4

Math 116

(1) Apply the product rule to evaluate each derivative. (For (a) - (c), do not simplify your answer.)

(1a) $\frac{d}{dx}(x^2+2x+1)(3x^3+2)$
(1b) $\frac{d}{dx}(x^3+x^2+2x)(5x^6+2x^2)$
(1c) $\frac{d}{dx}(x^4+x^3+x^2+x)(x^3+x^2+x+1)$
(1d) $\frac{d}{dx}(x^5e^x)$
(1e) $\frac{d}{dx}(e^x\ln(x))$
(1f) $\frac{d}{dx}(x^3\ln(x))$

(2) Apply the quotient rule to evaluate each derivative. Simplify your answer.

(2a) $\frac{d}{dx}\left(\frac{x^2+1}{x}\right)$

(2b) $\frac{d}{dx}\left(\frac{x^3}{x^5+1}\right)$

(2c) $\frac{d}{dx}\left(\frac{x^2+x}{x^3+1}\right)$

(2d) $\frac{d}{dx}\left(\frac{e^x}{x^2}\right)$

(2e) $\frac{d}{dx}\left(\frac{x^3+3}{e^x}\right)$

(2f) $\frac{d}{dx}\left(\frac{\ln(x)}{x}\right)$

(3) Apply the chain rule to evaluate each derivative. Simplify when possible.

(3a) $\frac{d}{dx}(x^8+x^4)^5$
(3b) $\frac{d}{dx}e^{x^3+x}$
(3c) $\frac{d}{dx}\ln(3x^2+5)$
(3d) $\frac{d}{dx}\sqrt{x^2+1}$
(3e) $\frac{d}{dx}e^{\ln(x)}$
(3f) $\frac{d}{dx}\ln(x^2+2x+2)$

Answers to Suggested Homework for Lecture 4

Math 116

(1a) $(2x+2)(3x^3+2)+(x^2+2x+1)(9x^2)$
(1b) $(3x^2+2x+2)(5x^6+2x^2)+(x^3+x^2+2x)(30x^5+4x)$
(1c) $(4x^3+3x^2+2x+1)(x^3+x^2+x+1)+(x^4+x^3+x^2+x)(3x^2+2x+1)$
(1d) $5x^4e^x+x^5e^x=(x^5+5x^4)e^x$
(1e) $e^x\ln(x)+\frac{e^x}{x}$
(1f) $x^2+3x^2\ln(x)=x^2(1+3\ln(x))$

(2a) $\frac{x^2-1}{x^2}=1-\frac{1}{x^2}$
(2b) $\frac{-2x^7+3x^2}{(x^5+1)^2}$
(2c) $\frac{-x^4-2x^3+2x+1}{(x^3+1)^2}$
(2d) $\frac{xe^x-2e^x}{x^3}$
(2e) $\frac{-x^3+3x^2-3}{e^x}$
(2f) $\frac{1-\ln(x)}{x^2}$

(3a) $5(x^8+x^4)^4(8x^7+4x^3)$
(3b) $e^{x^3+x}(3x^2+1)$
(3c) $\frac{6x}{3x^2+5}$
(3d) $\frac{x}{\sqrt{x^2+1}}$
(3e) $\frac{e^{\ln(x)}}{x}$
(3f) $\frac{2x+2}{x^2+2x+2}$