Math 215 Practice set 1 (due 8/28/08)

Read section 7.1
Remember your calculus? Differentiate the following functions:

Practice 1 \(x^5 + 3x + 2\)
Practice 2 \(2^x\)
Practice 3 \(\ln x\)
Practice 4 \(x^5 e^x\)
Practice 5 \(\sqrt{\ln x}\)
Practice 6 \(x/\ln x\)

Practice 7 Using the second chapter 7, do the following problems in section 7.1:
1. #1, 3, 5, 7

Math 215 To-turn-in set 1 (due 8/28/08)

Remember your calculus? Differentiate the following functions:

Problem 1 \(x^4 + 3x^2\)
Problem 2 \(3e^x\)
Problem 3 \(x \ln x\)
Problem 4 \(\sqrt{5 + 3x^2}\)
Problem 5 \(\frac{x^2}{\ln x}\)
Problem 6 \(e^{3x} \sqrt{x}\)

Problem 7 Using the second chapter 7, do the following problems in section 7.1:
To turn in:
1. #2, 4, 6, 8

Math 215 Practice set answers
1. 

\[ f(x) = x^5 + 3x + 2 \]
\[ f'(x) = 5x^4 + 3 \]

2. 

\[ f(x) = 2^x \]
\[ f'(x) = (\ln 2)2^x \]

3. 

\[ f(x) = \ln x \]
\[ f'(x) = 1/x \]

4. 

\[ f(x) = x^5e^x \]
\[ f'(x) = x^5 \frac{d}{dx}(e^x) + \frac{d}{dx}(x^5)e^x \]
\[ = x^5e^x + 5x^4e^x \]

5. 

\[ f(x) = \sqrt{\ln x} \]
\[ = (\ln x)^{1/2} \]
\[ f'(x) = \frac{1}{2}(\ln x)^{-1/2} \frac{d}{dx}(\ln x) \]
\[ = \frac{1}{2}(\ln x)^{-1/2} \frac{1}{x} \]

6. 

\[ f(x) = x/\ln x \]
\[ f'(x) = \frac{\ln x \frac{d}{dx}(x) - x \frac{d}{dx}(\ln x)}{(\ln x)^2} \]
\[ = \frac{(\ln x)(1) - x \frac{1}{x}}{(\ln x)^2} \]
\[ = \frac{\ln x - 1}{(\ln x)^2} \]

or equivalently, you could do:
\[ f(x) = \frac{x}{\ln x} = x(\ln x)^{-1} \]

\[ f'(x) = \frac{d}{dx} \frac{x}{\ln x} = x \frac{d}{dx} (\ln x)^{-1} + \frac{d}{dx} x(\ln x)^{-1} \]

\[ = x(-1)(\ln x)^{-2} \frac{d}{dx} (\ln x) + (1)(\ln x)^{-1} \]

\[ = x(-1)(\ln x)^{-2} \frac{1}{x} + (1)(\ln x)^{-1} \]

\[ = -(\ln x)^{-2} + (\ln x)^{-1} \]

\[ = -\frac{1}{(\ln x)^2} + \frac{1}{\ln x} \]

\[ = -\frac{1}{(\ln x)^2} + \frac{\ln x}{(\ln x)^2} \]

\[ = \frac{\ln x - 1}{(\ln x)^2} \]

Answers to book problems found in the back of the book.